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"(ENABLING) ROAMING MANAGEMENT IN GPRS AND WLAN NETWORKS BASED ON SIP"

Thesis

Presented as a partial fulfillment of the requirements for the degree of

MASTER IN SCIENCES WITH SPECIALITY IN ELECTRONIC ENGINEERING (TELECOMMUNICATIONS)

by

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To

My God, **Jehova.**

My little daughters **Dulce Selene, Diana Laura & Daniela Guadalupe**,
(mi energía vital, regalos divinos).

My beloved husband **Lambertino Campos,**
(mi amigo, cómplice, ángel y fortaleza).

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"Gracias a todos aquellos que me acompañaron en este caminar, a mi esposo e hijas,
a mis padres y hermanos, a mis sobrinos, tíos y primos, a mis compañeros y amigos,
a mis maestros y a mis escuelas, a ti Señor, que estuviste en todos ellos"

ABSTRACT

Wireless networks technologies put focus on mobility management and transparent connectivity when user roams. These technologies must be integrated in a single environment based on All-IP networks. Thus, mobile users could be able to visit and connect any heterogeneous networks technologies. Unfortunately, technical issues and the lack of roaming agreements between the different networks operators avoid the transparent interoperability.

Our work is based on compare and analyze two roaming approaches in order to integrate communication and session control between two different networks technologies. We examine solutions based on loose coupled integration and IP mobility, which provide mobile applications (multimedia IP) and mobile services (AAA functions and user profiles). The approaches are based on the classification for service composition of the SAHARA project [39]: 1) Cooperative Model and 2) Brokered Model. Both models depend on the *Service Level Agreements* (SLAs), which represent a low cost and fast time-to-market [14].

The main goal consists to compare both models in the *Next Generation Networks* (NGN) that enable roaming management and session control from GPRS to WLAN, using SIP signaling and following the same principles, conditions and assumptions.

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LIST OF ABBREVIATIONS

ABREVIATURE	*DESCRIPTION*
3G	*Third Generation*
3GPPv5	*3rd Generation Partnership Project version 5*
4G	*Fourth Generation*
AAA	*Authentication, Authorization and Accounting*
AMPS	*Advanced Mobile Phone Services*
AP	*Access Point*
AuC	*Authentication Center*
BG	*Border Gateway*
BM	*Brokered Model*
BS	*Base Station*
BSC	*Base Station Controller*
BTS	*Base Transceiver Station*
CDMA	*Carrier Division Multiple Access*
CM	*Cooperative Model*
COPS	*Common Open Policy Service*
CS	*Circuit Switched*
CSCF	*Call State Control Function*
CT2	*Cordless Telephone for Second Generation*
DAR	*Dynamic Address Reconfiguration*
DARPA	*Defense Advanced Research Projects Agency*
DECT	*Digital European Cordless Telephone*
DHCP	*Dynamic Host Configuration Protocol*
DS	*Distribution System*
DSL	*Digital Subscriber Line*
DSS	*Direct Sequence Spread Spectrum*
EIR	*Equipment Identity Register*
ESS	*Extended Service Set*
FM	*Frequency Modulated*
FMC	*Fixed Mobile Convergence*
FSS	*Frequency Hopping Spread Spectrum*
GAN	*Generic Access Network*
GGSN	*Gateway GSN*
GIF	*GPRS interworking function*
GNOME	*GNU Network Object Model Environment*
GMS	*Global Systems for Mobile Communications*
GMSC	*Gateway Mobile Switching Center*
GPRS	*General Packet Radio Service*
GSN	*GPRS Support Node*

HA	*Home Agent*
HFC	*Hibryd Fiber/Coax*
HLR	*Home Location Register*
HN	*Home Network*
HO	*HandOver, HandOff or Automatic Link Transfer*
HPLMN	*Home PLMN*
HRDS	*High Rate Direct Spread Spectrum*
HSS	*Home Subscriber System*
ICMP	*Internet Control Message Protocol*
IETF	*IP Working Group of the Engineering Task Force*
IETF	*IP Working Group of the Engineering Task Force*
IMS	*IP Multimedia Subsystem*
IMSI	*International Mobile Subscriber Identity*
IP	*Internet Protocol*
IPv4	*IP version 4*
IPv6	*IP version 6*
ISP	*Internet Service Provider*
ITU	*International Telecommunication Union*
KDE	*K Desktop Environment*
LA	*Localization Area*
LDAP	*Lighweight Directory Access Protocol*
MAC	*Medium Access Control*
MAP	*Mobile Application Part*
MIP	*Mobile IP Protocol*
MIPv4	*Mobile IP version 4*
MIPv6	*Mobile IP version 6*
MN	*Mobile Node or Mobile Host*
MS	*Mobile Stations = UE+SIM*
MSC	*Mobile Switching Center*
mSCTP	*Mobile Stream Control Transmission Protocol*
NGN	*Next Generation Networks*
NS2	*Network Simulator version 2*
NSF	*National Science Foundation*
NSS	*Network and Switching Subsystem*
OSI	*Open Source Interconnection*
OSS	*Operation Support Subsystem*
OTcl	*Object oriented Tool common language*
PAC	*Personal Access Communications*
PCU	*Packet control Unit*
PDN	*Packet Data Network*
PDP	*Packet Data Protocol*
PSDNs	*Packet Switched Data Networks*
PDP	*Packet Data Protocol*

PLMN	*Public Land Mobile Network*
PSTN	*Public Switching Telephone Network*
QoS	*Quality of Service*
RA	*Routing Area*
RADIUS	*Remote Authentication Dial-In-User Service*
RB	*Roaming Broker*
RLC	*Radio Link control*
RSS	*Received Signal Strength*
RSVP	*Resource Reservation Protocol*
RTP	*Real Time Protocol*
SAHARA	*Service Architecture for Heterogeneous Access, Resources and Applications*
SCTP	*Stream Control Transmission Protocol*
SGSN	*Serving GSN*
SIM	*Service Module Identification*
SIP	*Session Initiation Protocol*
SLAs	*Service Level Agreements*
SMS	*Short Messages Service*
Tcl	*Tool common language*
TCP	*Transport Control Protocol*
TDMA	*Time Division Multiple Access*
TIM	*Traffic Indication Map*
UDP	*User Datagram Protocol*
UE	*User Equipment*
UMTS	*Universal Mobile Telecommunications System*
URI	*Universal Resource Identifier*
VINT	*Virtual InterNetwork Testbed*
VLR	*Visitor Location Register*
VN	*Visited Network*
VoIP	*Voice over IP*
VPLMN	*Visitor PLMN*
WiFi	*Wireless Fixed*
WiMAX	*Worldwide Interoperability for Microwave Access*
WISP	*Wireless Internet Service Provider*
WLAN	*Wireless Local Area Network*

Chapter 1

INTRODUCTION

The topic of this thesis *"*(Enabling) Roaming management in GPRS and WLAN networks based on SIP" reflects a paradigm shift towards new generations of mobile networks known like *Next Generation (*NG) networks. The vision of the NG networks lead up towards an environment in which IP technology provides transparent connectivity (all-IP network). It includes the provision of roaming and mobility management between mobile users in heterogeneous networks technologies, in which different services and traffic types evolve without *Quality of Service* (QoS) degradation.

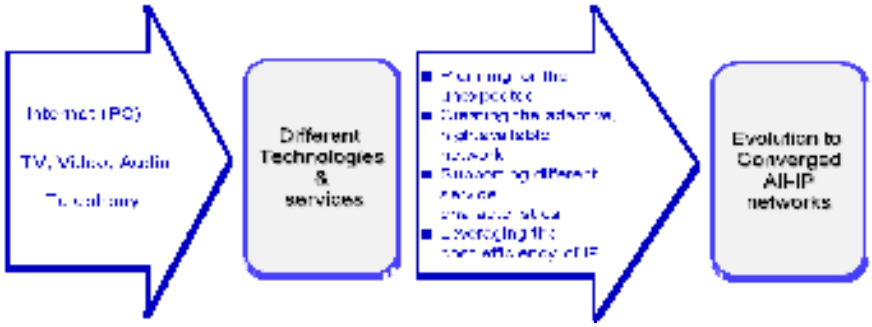

Figure 1.1 Evolution to a converged All-IP networks [34].

The evolution towards "all IP" multi-service infrastructure like that shown in the Figure 1.1, present an important goal in the purpose of the NG systems, where different technologies can interoperate and provide different kinds services (like multimedia, VoIP, etc.) and QoS equivalents or even with better level that the presented by the wired networks. Also NG systems improve the connectivity with others wireless and wired systems.

As far as the NG networks are concerned, the following points are considered important for NG networks [34]: transition to an all IP network infrastructure; support for heterogeneous wireless access technologies, such as UTRAN, wireless local area networks, wireless personal area networks, and *third generation* (3G); seamless handovers across both homogeneous and heterogeneous wireless technologies; mobility and QoS support; deployment of new protocols for services as *Authentication, Authorization and Accounting* (AAA) (e.g. DIAMETER) and their

interworking whit existing technologies, such as the home/visited location register (HLR/VLR) and *Mobile Application Part* (MAP) in *Global Systems for Mobile Communications* (GMS), and *Remote Authentication Dial-In-User Service* (RADIUS) in the Internet; support of different types of mobility (terminal, session and personal mobility); and mechanism to support service roaming.

1.1 PROBLEM STATEMENT AND MOTIVATION

Both 3G and WLAN technologies are positioned in the market separately, but their markets overlap at some points. Technologies such as WLAN and Bluetooth offer wireless connectivity characterized by high speeds and low costs but with limited mobility, semi-stationary and dependent of the location. By other side, 3G systems offer lower speeds and higher costs, but with true mobility. Technically, GPRS which is a prelude to 3G evolution is designed to serve highly mobile subscribers with sophisticated high power radio. Cell diameters could exceed 10 km. The current available data rate is in the range of 20-170 kbps. In contrast, WLAN uses short range low power radio and are mainly deployed for indoor environments for low mobility. Comparing these technologies is obvious that combining all the advantages of all the technologies will lead to a better network. See Figure 1.2.

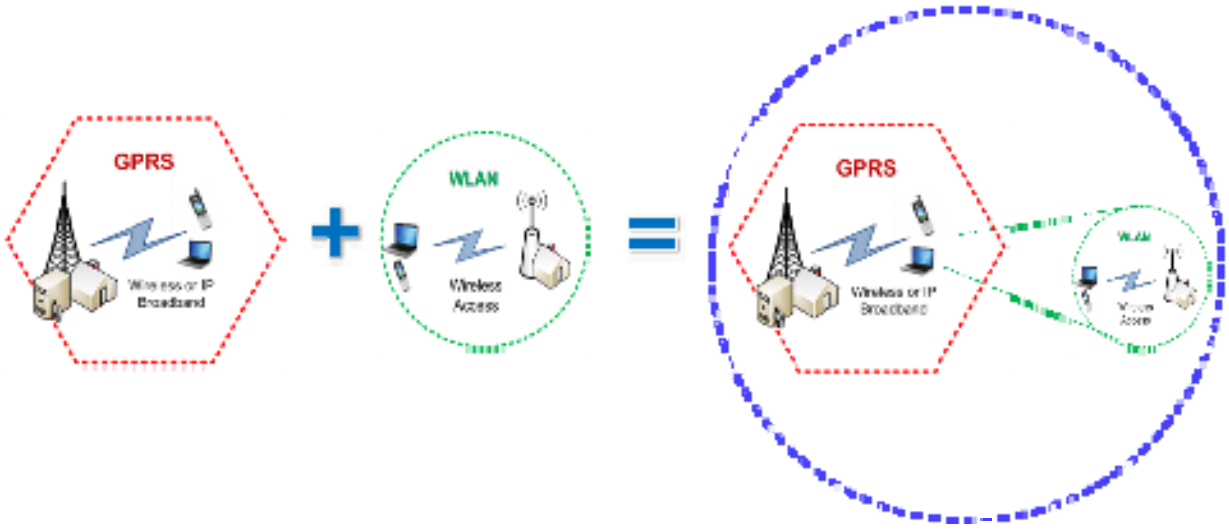

Figure 1.2 Heterogeneous networks of GPRS and WLAN.

The original vision of 3G systems requires the interoperability between 3G cellular technologies and other like as satellite, WLAN and Bluetooth for provide a global coverage without interruption. Handoff between 3G/GPRS-WLAN have been successful [10], [22], [26], [30] and [31]. Standards organizations have started the standardization of the integration of

WLANs and 3G/GPRS [36]. The 3G partnership Project (3GPP) defines the requirements, principles and interworking scenarios for the integration of WLANs and 3GPP [15].

Currently there is no common control layer for joining the services (in a wide sense of service) of multiple kinds of networks technologies which represents a crucial challenge both technically and from a user perspective [23] and [16]. In addition, when a user moves from one domain to another, it is necessary to provide him, with his home environment functionality and update the user´s profile in the visited network [17]. For example when customers are using a service as videoconference at a given moment, they do not need know what wireless technology, base station or access point, router have assigned, they only need to experience seamless service. Various researchers have studied different methods to bring roaming managing and achieving the integration of heterogeneous networks. Through two traditional methods: the loose coupling [36], and the tight coupling [34]. Unfortunately, technical issues and the lack of roaming agreements [11], [14], [16] and [39] between the different networks operators avoid transparent interoperability. Although, this is not easily controllable or manageable with today's technologies, it is not impossible to achieve. Several mobility protocols have been proposed for wireless Internet [1], [5], [11], [25], [34] and [40]. Despite the fact that these protocols have the common goal of location transparency, they differ a lot from each other due to choices made during design and implementation phases.

Providing seamless mobility support is one of the most challenging problems towards an all IP NG network [46]. Due to the transparency to the lower layer characteristics, application layer management like the *Session Initiation Protocol* (SIP) has been considered as the right candidate for handling mobility in the heterogeneous wireless networks [15]. The SIP is located at session layer in *Open Source Interconnection* (OSI) model and the application layer in TCP/IP model. SIP has been chosen in *IP Multimedia Subsystem* (IMS) [15] and [45] to play the key role for setting up the session while interworking with other protocols like *Real Time Protocol* (RTP), *Common Open Policy Service* (COPS), RADIUS, DIAMETER protocol, *Resource Reservation Protocol* (RSVP), Megaco, etc. The motivations for utilizing SIP spawned from its ability to provide session management as a mean to provide personal and service mobility based on different kinds of agents (proxy and user).

1.1.1 Justification

The presence of multiple independent service providers poses new and significant challenges in the purpose of the NG systems. Managing trust across providers and verifying the performance of the components in composition become essential issues. Adapting the

composed service to network and user dynamics by choosing service providers and instances is yet another challenge. In the *Service Architecture for Heterogeneous Access, Resources and Applications* (SAHARA) project [39] service composition was classified into two models based on the type of interaction between composed component service providers: in the *Cooperative Model* where the service providers interact in a distributed fashion and distributed responsibility, to provide an end-to-end composed service; and in the *Brokered Model* where a single provider, the broker, uses the functionalities provided by underlying service providers and encapsulates these to compose the end-to-end service. Recent researches had started the introduction of the method based on Brokered Model [14], [16], [39] for telecommunications area.

As vertical mobility means mobility between non homogeneous technologies, one has to consider the factors that diversify the wireless technologies. For example, data rates or user services. The service providers have to understand what type of applications that can be offer in vertical mobility sceneries and provide to user with a transparent vertical mobility for a mobile user roaming between different types of networks deriving in set special attention in the form of manage mobility. Consequently, based on the classification in the SAHARA project, this thesis propose to compare the performance for roaming management using SIP in both models (cooperative and brokered), based on a loose coupled GPRS-WLAN integration.

We propose the use SIP signaling like the roaming signaling protocol for both models, thus we take advantage of SIP mobile agents to reduces network traffic avoiding congestion within both networks. Furthermore we promote the use of *Service Level Agreements* (SLAs) to access visited network management by different services providers [14]. This guarantees a minimum of QoS roaming from GPRS to WLAN. The SLAs must contain the characteristics of service supplying and conditions to collaborate on the authentication and authorization process. Our contribution is when our management roaming and session control (in both models) are done under our SIP enhancement with AAA [7], before establishing a session of *Voice IP* (VoIP). The improvements focus on the guidelines for authors of extensions to the SIP described in IETF RFC 4435 [9] and comprises authentication in network registration and authorization in the session initiation; in addition to SIP agents existent, the SIP roaming broker agent was designed, which is used only in the Brokered Model.

1.2 OBJECTIVE

The objective of this work is to compare NG networks based on SIP signaling to enable roaming management and session control for GPRS & WLAN following the same principles, conditions and assumptions.

1.2.1 Particular Objectives

- To evaluate the performance supporting multimedia IP applications control from GPRS to WLAN networks, based on loose coupling integration using Cooperative and Brokered Models in terms of delay for network access and logon accessed VoIP.
- To contribute to the development of NG systems with the result of this study.
- To contribute with the code for new SIP agent (broker) into NS 2.33 based on Module SIP by Rui Prior.

1.3 SCOPE AND METHODOLOGY

To achieve access control in any place, first it is important to know the protocols existent and select the method that better respond to our needs. The same form is used in this project, at begin, the principal mobility protocols was studied as well as the scenarios where they apply. Also it key to know and understand the principal technical characteristics of each independent network, its architecture, handoff method and the manner in that realize roaming. Literature review and understanding theoretical fundamentals about the different methods of integration between GPRS and WLAN networks is necessary for building scenarios to simulate the behavior under each and under specifics conditions that is required to reach the objective of this thesis.

The simulation was realized on NS2 version 2.33 and it will be probed over two different distribution of operating system Linux, Ubuntu 9.04 and Suse 11.1. Firstly was an exhaustive search and comparison of different simulators for networks was done. NS2 was selected partly because it is the most widely used network simulator by the researchers which bring trust and also because is a free distribution. Afterwards, we were investigated the existent NS2 modules that are related to our investigation. These implied the study of network simulator, its structure, characteristics and components but principally the code of Module SIP existent to make improvements in the process of messages and responses of the signaling.

To realize the computational simulations, firstly we established settlements of level service amongst the different wireless unlicensed service providers with a GPRS services provider or

roaming broker depending of the model used in the loose coupled integration. We used two kinds different of simulation environments. It was due that the Module SIP original for NS2 only support simple loose coupled integration, but not offer support the third entity “broker” (key element in the Brokered Model). Therefore, our contribution is the code addition for the support of SIP roaming broker agent into Module SIP and rebuilt of NS2 was necessary. So that we get two different simulation environments. So that, first we simulated a Cooperative Model that enable roaming between GPRS and WLAN networks through a SIP enhancement with authentication and authorization. Afterwards, in reconfigured NS2, we simulated a Brokered Model that also enables roaming through SIP (enhancement with authentication and authorization).

1.4 THESIS STRUCTURE

We describe the theoretical fundamentals of mobility management and control session in the loose coupled integration using SIP, throughout the chapters. In chapters 2 to 4 are examine the principles of the protocols to support mobility on wireless IP networks; the models to integrate vertical mobility between WLAN and GPRS; and related works that offers interesting approaches concerning service mobility in heterogeneous wireless networks to expose the state of the art in the topic. The fifth chapter describes our contributions to network registration and session initiation to SIP into the two models (Cooperative and Brokered); and in the sixth chapter we detailed the system structure, parameters, assumptions and the simulation results. Conclusions focused on recommendations for future works are presented in the last chapter.

In addition this thesis has attached three appendixes. The first with a brief description of NS2 [51] version 2.33 and the directions for rebuilt the environment of the project under two distributions of Linux: Suse 11.1 and Ubuntu 9.04. The second depict the contributions (additions) for authentication, authorization, and accounting to the SIP Module [52] for both models made in *C++* language. Finally is revealed the script codes for models in *Tcl* language, and too the code in *awk* language for interpreted the file traces generated.

Chapter 2

MOBILITY PROTOCOLS ON IP NETWORKS

Laptop computers introduce the need of mobility; these sort of mobile nodes frequently change their point of attachment to the network. Under the existing protocol, a *mobile node* (MN) has to change its IP address whenever it changes its point of attachment, therefore is impossible for a node to maintain transport and higher layer connections when the node changes location.

To provide a mechanism to support seamless services across heterogeneous wireless access networks and location transparency, the mobility protocol also need to provide network transparency, in the following, we presented an overview of the three mobility protocols that work on IP networks and specially they work with SIP, which was selected in this work.

2.1. IP MOBILITY SUPPORT

Internet Protocol (IP), which is the most popular network layer protocol for data networks, was not designed with wireless or mobile networks in view. The IP address is used for dual purposes, for routing packets through the Internet and also as endpoint identifier for applications in end hosts.

2.1.1 Mobility Support for IPv4

The Mobile *IP Working Group of the Engineering Task Force* (IETF) proposed a standard. Their proposal evolved through a series of draft into a few protocols: IP Mobility Support, Route Optimization in Mobile IP, IP Encapsulation within IP, and Minimal Encapsulation within IP, [1].

IP Mobility Support is the base protocol (called *Mobile IP)* primarily concerned with the maintenance of mobility bindings. A mobility binding is the association of the MN's home address, a *Care of Address* (CoA) representing its current location, along with the remaining lifetime of that association (or lifetime of the MN's registration in a foreign network). On the home network, a special machine is designated as the HA which is responsible for intercepting packets that are sent by a *Corresponding Node* (CN) or correspondent host (sending machine) to a MN which is away from home, and rerouting them to current location of the MN. Thus, the HA

is responsible for maintaining the location information for a MN. Each networks which supports mobility, also has a special machine that can be designated as a FA that provides forwarding service in the MN`s current location.

Mobile IP version 4 is a triangular routing. Each mobile node *(*MN) is assigned a unique IP address, called a *home address* which is administered the same way as an IP address provided to a stationary host. The home address associates each MN with a home network, which is a virtual network with a prefix matching that of the MN's home address.

In the triangle routing, MIP enables datagrams addressed to the MN at the HA to be delivered wherever the MN is. As depicts in Figure 2.1 the CN transmits a datagram to the MN that is routed to MN's home network as usual in step (1). The HA intercepts the packet, encapsulates and tunnels it to FA instep (2). The FA decapsulates and forwards the packet to the MN in step (3). Packets from the MN to the CN are sent as usual (4).

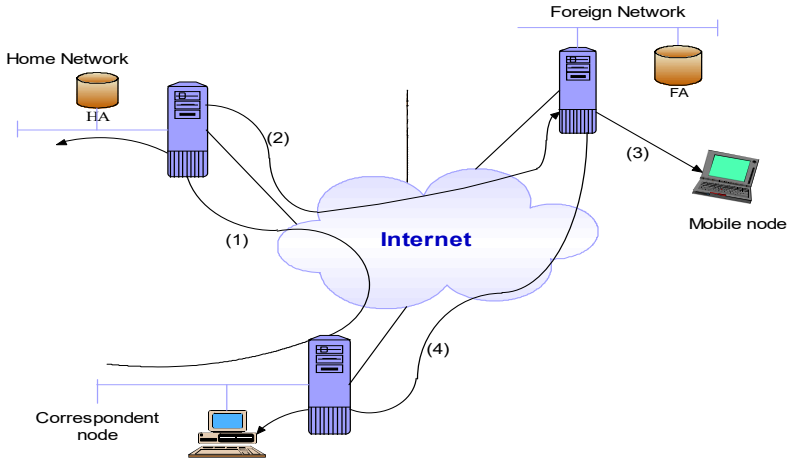

Figure 2.1 Triangle Routing in Mobile IP.

MN, each time it connects to a network other than the home network (foreign network), registers with the FA. Then it obtains a CoA which is the reference pointer to the MN when it is visiting the foreign network, when the MN acts as its own FA, it is called *collocated CoA* from either the FA or through some external assignment mechanism such as the *Dynamic Host Configuration Protocol* (DHCP) server. Thus, when the FA receives the packets rerouted by a HA of one of its registered MNs, it does not necessary address translations and delivers them to the MN using the CoA. Thus the registration in MIP can be depicted as shown in Figure 2.2.

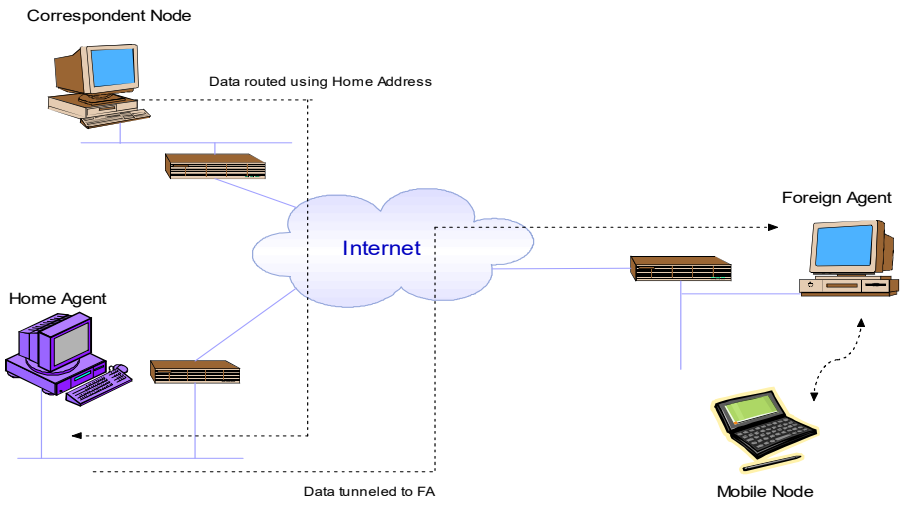

Figure 2.2 Registrations in Mobile IPv4.

In addition, the FA may act as a default router for registered MNs when transmitted. The rerouting of packets is done by encapsulating the IP packet with another IP header which has the CoA as the destination address. This IP within IP encapsulation is referred to as *tunneling*, [2], which has solved problems that appears in the tunnel from a HA to a FA, such as fragmentation and FA unreachability issues. A *tunnel* is the path followed by an IP packet while it is encapsulated by the HA, and reaches the FA over the tunnel. The FA then decapsulates the packet and forwards it to the MN.

2.1.2 Mobility support for IPv6

The main motivation to build and deploy a new Internet Protocol was to solve the growth problems the Internet is encountering, mainly routing and addressing [5] and [6]. Global Internet routing based on the 32 bit addressed of IPv4 is becoming increasingly strained. IPv4 addresses do not provide enough flexibility to construct efficient hierarchies that can be aggregated.

The *Mobile IPv6 protocol* (MIPv6) [1] enables a MN to communicate with other nodes after changing its point of attachment from one IP subnet to another without changing its IP address. Without this feature the MN would not be able to maintain transport and higher layer protocol sessions, which depend on a static IP address. The problem is solved by assigning two IP addresses to a mobile host: a permanent IP address, which is called IP home address, and a temporary IP address (CoA), which is assigned each time the MN is visiting a new foreign subnet. HA is used for transport and higher layer sessions whereas CoA is needed to route

packets correctly to the actual point of attachment. In this way, the impact of host mobility is reflected only in the routing layer.

A MN is a node that can change its point of attachment to the Internet, whereas a CN is a host communicating with the MN. Packets of new calls are intercepted by the HA and then tunneled to the MN's CoA by using IPv6 encapsulation, whereas packets belonging to active sessions are sent directly to CoA, packets from the MN are sent to the CN through the Internet as usual. In basic MIP, each HO implies end-to-end signaling.

A HA is a router in the MN's home network, handling the mobility of the MN. Every time that the MN gets a new CoA, it has to register it to the HA and the CN, by sending BU messages. If a MN sends BU to its HA or CN, then it is called a *registration* or *deregistration*. A MN sends a registration when it is in a foreign subnet and deregistration when it is in its home subnet. These messages are sent as IPv6 Destination Options. The Figure 2.3 depicts the packet flow of MIPv6 in registration/deregistration operations.

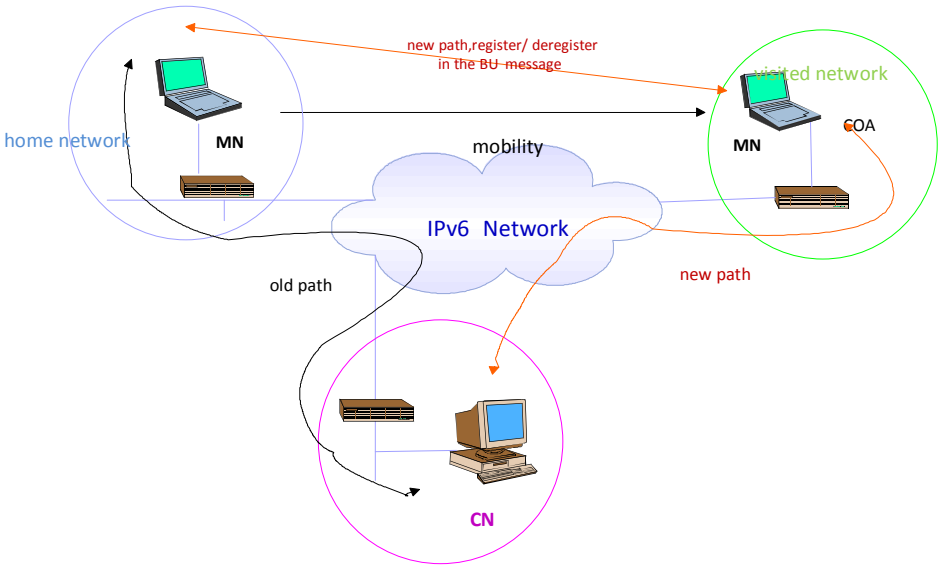

Figure 2.3 Packet Flow of MIPv6

When a MN enters a foreign subnet, it immediately sends a BU to its HA or a CN to inform them of its new CoA. The HA or CN receives the BU, register the binding and subsequently sends any packet destined for the MN's HA and its CoA. In the case of the HA, it also adds as a middle for the MN, by intercepting any packet sent to the MN's home address and forwarding them to the MN's CoA.

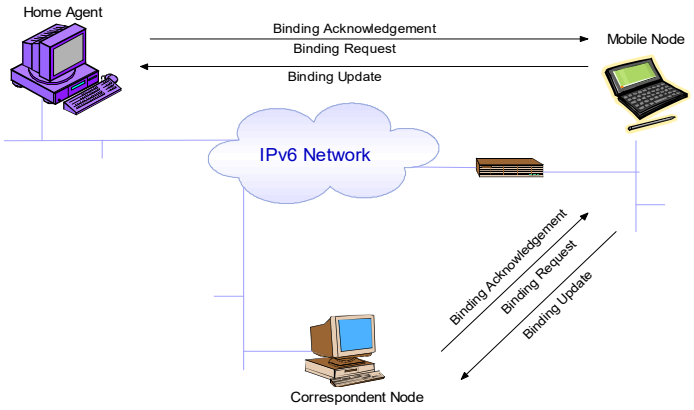

Figure 2.4 Registrations in Mobile IPv6.

Upon returning home, the MN sends BU's to inform the HA/CN that is in its home subnet and to delete any bindings the HA/CN has for the MN. When a HA receives the binding update, it also stops acting as a middle man for the MN. The HA or the CN receives a BU by sending back a BA. This informs the MN whether the registration/deregistration is successful or not. The BR allows the HA or CN to actively request a BU from a MN. This process avoids triangular routing and is called *route optimization* which makes sure packets destined to the mobile node can be directly routed to the mobile node's current location like shown in Figure 2.4

Comparison of IPv4 and IPV6 features for mobility

Between the IPv4 of the protocol and the IPv6 description significant improvements have been made. While the IPv4 tried to accomplish mobility requirements without changing the underlying protocol the new version had some influence of the basic protocol design.

There are some important differences for the two IP versions regarding mobility and mobility management. For IPv4 we can generally conclude that mobility was added later. For IPv6 mobility was specified for fixed hosts, routers and mobile hosts. Given that vendors will comply with these specifications it will make the usage of IPv6 very attractive from a commercial point of view. For high-speed wireless access with frequent location updates the micro mobility must still be designed and implemented. Unless immediate compatibility with IPv4 is needed, it would be unwise to invest much power into it. If it is really a requirement, one should try to design and implement the micro mobility in a transparent fashion that would work with either version of IP [15] and [31], check Table 2.1.

Table 2.1 Comparison of IPv4 and IPv6 features for mobility.

IPv4	Feature	IPv6
Add-on, compatibility favored	MOBILITY	Built in
Address availability in foreign subnetworks	ADDRESSING PROBLEMS	No addressing problems
Needs home and foreign agents		Efficient, allows to use direct route from correspondent to mobile, does not need foreign agent
Triangle routing		Route optimization
Add-on	SECURITY	Built-in, but no access policy for foreign networks
Packets to MN always forwarded/tunneled	OTHERS	Packets send by the MN carries in its home address the CoA and destination option with real home address May be unsupported

The operation concept of MIPv6 in general is similar that of MIPv4, but protocol wise are many changes, in particular MIPv6 does not have a FA that is used in MIPv4, so that the triangular routing is eliminated. Also is important to mention the set of extension headers allows piggy backing of signaling information to facilitate transparent routing of IPv6 packets to MN.

2.2 MOBILE STREAM CONTROL TRANSMISSION PROTOCOL

Before introduce the mobility protocol based on *Stream Control Transmission Protocol* (SCTP), a brief description of this is presented. SCTP is a next generation transport layer protocol for the Internet. The transport layer is the lowest layer to support end to end services; introduces the idea of multi-homing, which allows using multiple source destination IP addresses (connections) with different interfaces for a single association between two SCTP endpoints simultaneously. These IP addresses are exchanged and verified during the initiation of association, and are considered as logically different paths between SCTP peers (endpoints) [29] and [34].The multi-homing concept is shown in Figure 2.5. The typical use of SCTP is for reliable data stream transmission between a server and its client.

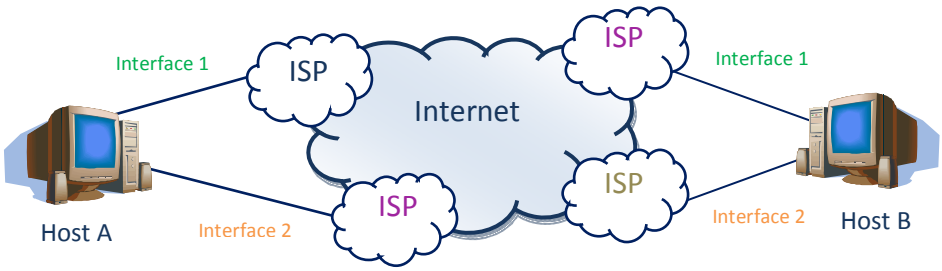

Figure 2.5 Multi-homing concept.

The biggest difference to TCP is multi-homing, the concept of several streams within a connection (multi-streaming) and the transportation of sequence of messages instead of sequence of bytes, like depicts Figure 2.6. The multi-streaming, allows establish associations whit multiple streams. Streams are unidirectional data flows within a single association setup and valid during the whole association lifetime. Each stream is distinguishing whit the Stream Identifier field included in each piece, so that chunks from different streams can be concatenated inside one packet. To preserve order within a stream the Stream Sequence Number is used. Consequently, TCP´s Head-of-Line blocking problem is reduced to the affected stream only, not entire association.

The *Mobile Stream Control Transmission Protocol* (mSCTP) is a transport layer mobility protocol providing mobility management. Mobility management in the transport layer is accomplished by the use of SCTP and its currently proposed Dynamic Address Reconfiguration (DAR) extension. The SCTP DAR extension enables the endpoints to add delete and change the primary address dynamically in an active connection without affecting the established connection. mSCTP is a similar to *Transmission Control Protocol* (TCP) that operates on top of the unreliable connection-less packet network. It provides unicast end- to-end communication between two or more applications running in separate hosts and offers connection-oriented, reliable transportation of independently sequenced message streams.

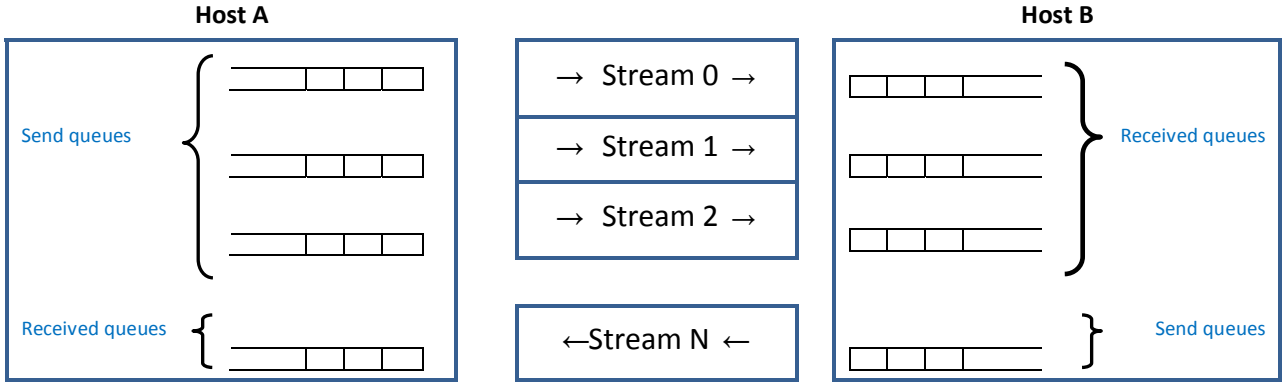

Figure 2.6 Multi-streaming concept.

mSCTP is capable of handling several multiple IP addresses at both endpoints while keeping the end-to-end connection intact. These addresses are considered as logically different paths between the endpoints. During the connection, list of addresses are exchanged between the endpoints. Both endpoints must be able to receive messages from any of the IP addresses related to the endpoints. One address is chosen as the primary address and is used as the destination for normal transmission. The other addresses are used for retransmissions only. The

SCTP DAR extension enables the endpoints to add delete and change the primary address dynamically in an active connection without affect the established connection.

However, simultaneous handover at both endpoints at same time is not supported [39] and it is also important to mention that in case of the mSCTP is targeted for mobile sessions originated from MN towards the CN it does a break connection, therefore to support location management from sessions originated by the CN an additional protocol must be used such as MIP or SIP.

2.3 SESSION INITIATION PROTOCOL

The *Session Initiation Protocol* (SIP) is "an application-layer control (signaling) protocol for creating, modifying, and terminating sessions with one or more participants. These sessions include Internet telephone calls, multimedia distribution, and multimedia conferences. SIP invitations used to create sessions carry session descriptions that allow participants to agree on a set of compatible media types. SIP makes use of elements called proxy servers to help route requests to the user's current location, authenticate and authorize users for services, implement provider call-routing policies, and provide features to users. SIP also provides a registration function that allows users to upload their current locations for use by proxy servers. SIP runs on top of several different transport protocols" [6].

Was developed by 3GPP [45] and designed like an evolution network of GSM [48]. To locate prospective session participants, and to other functions, SIP enables the creation of an infrastructure of network hosts called ***proxy servers*** to which ***user agents*** (the client and the server) can send registrations, invitations to sessions, and other requests.

SIP is a text-based protocol with syntax similar to that of HTTP. There are two different types of SIP messages [48]: requests and responses. The first line of a request has a *method*, defining the nature of the request, and a Request-URI, indicating where the request should be sent. The first line of a response has a *response code*.

For SIP requests RFC 3261 [6] defines the SIP response types and the following methods: ***REGISTER*** used by a UA to notify its current IP address and the URLs for which it would like to receive calls; ***INVITE*** used to establish a media session between user agents; ***ACK*** that confirms reliable message exchanges; ***CANCEL*** which terminates a pending request; ***BYE*** to terminates a session between two users in a conference; and ***OPTIONS*** to requests information about the capabilities of a caller, without setting up a call. SIP request messages are showed in Figure 2.7.

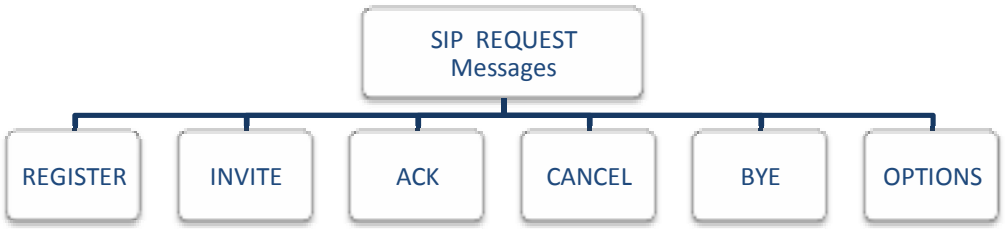

Figure 2.7 SIP REQUESTS messages.

The SIP response types showed in Figure 2.8 fall in one of the following categories: ***Provisional*** *(1xx)* that request received and being processed; ***Success*** *(2xx)* when the action was successfully received, understood, and accepted; ***Redirection*** *(3xx)* when an additional action needs to be taken (typically by sender) to complete the request; ***Client Error*** *(4xx)* if the request contains bad syntax or cannot be fulfilled at the server; ***Server Error*** *(5xx)* if the server failed to fulfill an apparently valid request; and ***Global Failure*** *(6xx)* when the request cannot be fulfilled at any server.

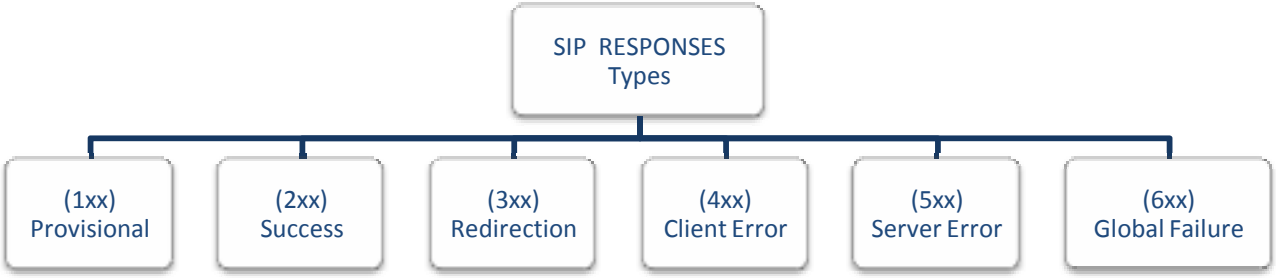

Figure 2.8 SIP RESPONSES messages.

Therefore, this protocol is a general purpose tool that works independently of underlying transport protocols and without dependency on the type of session that is being established. Moreover, SIP does not provide services but SIP can provide primitives to deliver a content session description (like IP address, ports and codecs) written in *Session Description Protocol* (SDP), will be used while the communication exist for instance, the endpoints can agree on the parameters of a session. Since SIP messages and the sessions they establish can pass through entirely different networks, SIP cannot, and does not, provide any kind of network resource reservation capabilities. SIP can reside in the communications device and handle these sessions and achieves that once the user has been located the correct session for the type of terminal he is using at the time needs to be established [36]. Wherever there is a requirement for real time sessions to be established. There are many more potential areas of use: IP Centrex, instant messaging, presence management, desktop call management and unified messaging, web commerce, on-line gaming application; to name a few.

2.3.1 SIP and IMS in UMTS

The *Central Network* (CN) of UMTS [15] can be considered like a basic platform that provide to its subscribers the communications services in *packets switched* (PS) and *circuited switched* (CS). The CN establish correspondences amongst QoS per to per with the UMTS carrier service. CN is formed by entities of equip called domains and subsystem. The domains interconnect one or more access network, the subsystem do not have a direct interface, it uses other technologies or interfaces defined apart to connect to a one or more domains of the CN. These entities are:

- Circuit Switched domain (CS)
- Packet Switched domain (PS)
- Subsystem Multimedia IP (IMS)
- Diffusion Domain

IMS is and entity which have an architecture of generic reference that offer multimedia services on IP infrastructure, the standard that specifies the characteristics of interoperability and roaming (interconnection between different networks), is integrated completely with existent data and voice networks. Also support multiple access technologies [15], including: GSM, GPRS, UMT, HSDPA, DSL, HFC, WLAN, WiMAX, Bluetooth, access to fixed wide band works, etc.).

The principal characteristics of the IP multimedia services within IMS [49] are: the communication can be established on real time or differed time, and can be oriented to a session from a user to other(s) user(s) or from user to a service; the IP multimedia sessions (composed by flows and multimedia contents like video, audio, text, image, application data, etc), have a level suitable of QoS; and the identification of users [46], services and nodes is through *Universal Resource Identifier* (URI), which can be in different SIP format (see Figure 2.9) raising the usability of services.

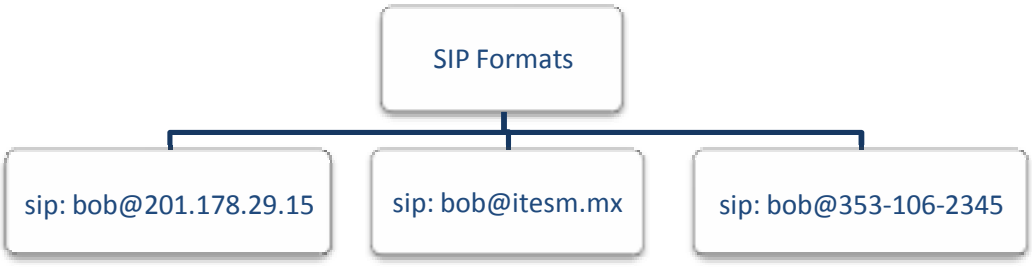

Figure 2.9 SIP Formats address.

IMS makes a true separation between network elements that is achieved using a layered design. Like depicts the Figure 2.10 the IMS network model [31] uses layers for distinct network functionalities:

- **The Application Layer**: that contains the applications servers that the operator wishes offer. These platforms are connected by means of the same session control layer for provide to final user convergent services. So then, in this layer is where IMS applications are hosted, such as *Push-to-Talk* (PoC), Instant Messaging, VoIP, Video on Demand, etc.
- **The Session Control Layer**: this has principal components of IMS architecture. The first is the *Call State Control Function* (CSCF), and the second is the data base of *Home Subscriber System* (HSS). Therefore, management control functions for applications access, user and service administration, billing and other functions.
- **The Connectivity Layer:** that provides network / internetwork connectivity moreover access technology from any type of terminal, subscribers access network for devices (by using of gateways and control servers) with the heart of IMS.

As the IMS network is modular and is composed of many network entities, therefore it has different interfaces, which adds complexity to the architecture.

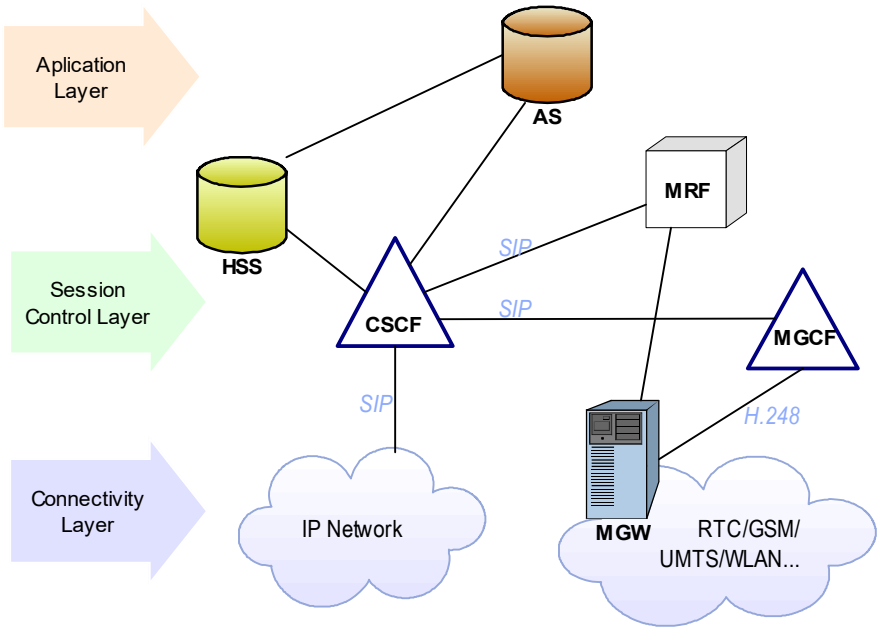

Figure 2.10 Modular Architecture in IMS networks.

The functional entity in IMS is the node CSCF, that integrates to three subsystems: *Proxy CSFC* (P-CSFC), *Serving CSFC* (S-CSF) and *Interrogations CSFC* (I-CSFC); which are in charge of: processing and route the signaling, control resources of transport subsystem, realize register and authentication of users, provide the IMS services through signaling deviation to application server, and generate the rate register. The HSS (data base), described each client, its terminals and its rights to access to distinct applications (profile). The nodes *Media Gateway Control function* (MGCF) and *IP Multimedia Gateway* (IM-MGW) permit the IMS inter function with the circuited commuted networks (RTB, RDSI, GSM, etc.), implementing respectively the control and user plane. Finally, the application servers and gateways with destination to service plane, which offer applications to users.

The user can connect to an IMS network in various ways, all of which use the standard IP. Direct IMS terminals (such as computers, mobile phones and PDAs) can register directly on an IMS network, even when they are roaming in another network (the visited network). The only requirement is that they can use IPv6 and run SIP user agents. Fixed access (e.g. DSL, cable modems, Ethernet), mobile access (e.g. W-CDMA, CDMA2000, GSM, GPRS) and wireless access (e.g. WLAN, WiMAX) are all supported [42] and [48].

Furthermore, SIP accommodates convergence and has potential to comply with all *IP Multimedia Subsystem* (IMS) requirements [31], including:

- **Modularity:** *SIP can signal for different entities (including endpoints and servers).*
- **Extensibility:** *SIP uses Internet extensibility mechanisms.*
- **Flexibility:** *SIP is very flexible using standard extensions.*
- **Security:** *SIP has both internal and external security mechanisms.*

2.4 COMPARISON MOBILITY PROTOCOLS

Is important observe the Table 2.2 which lists clearly the most distinct differences between the mobility protocols [34].

Table 2.2 Comparison of mobility protocols.

Protocol	Mobile IPv4	Mobile IPv6	mSCTP	SIP
Layer	Network	Network	Transport	Application
Transparency	Yes	Yes	Yes	Yes
Transport services	TCP/UDP	TCP/UDP	SCTP	TCP/UDP, SCTP, RTP
Deployment	HA in home network and FA in foreign network	HA in home network	Supported by client and server	Present in all elements that link the communication, user agents (terminal equipment) and proxy agents (servers)

In the last sections of this chapter was presented principal characteristics of mobility protocols using over IP networks. Here is an outline of these protocols.

MIP, is the protocol developed by the IETF to support IP mobility, therefore *is natural choice*. In addition was design for support mobility management, which includes two fundamentals functions: location and handover management mobility. Although it seems to be the architecturally right protocol for providing IP mobility, it requires changes in the infrastructure as well as the mobile host. *MIPv4* does not function if does not have the additional components (HA and FA) moreover introduces the concept of handover latency due to triangle routing (which is detrimental to real time traffic like streaming multimedia). Currently, for mobility management is an option that can provide an immediate solution for the design of architectures within existents networks communications, however is a time bomb because in a closely day the mobile nodes only will using IPv6 addresses, *MIPv6* is an enhancement of MIPv4, designed for solve the growth problems such routing and addressing, moreover the mobility like security were built in its design.

mSCTP, Unlike techniques based on MIP or SIP, the mSCTP does not require the addition of components such as home or foreign agents or server SIP, only requires using SCTP DAR as the transport layer beside TCP and UDP. Which is good but is not viable like requires that all the internet nodes must support SCTP in their TCP/IP protocol stack, therefore it does much more difficult than migration towards IPv6, furthermore if the CN and MN moves its point of attach the connection is broken.

SIP, is mainly used to establish, modify, and terminate multimedia sessions consisting of multiple media streams, unicast as well as multicast. Although SIP is not a mobility protocol (is a signaling protocol) can be used like as ´tool´ for provide management roaming and personalized user services through heterogeneous networks [41].

This, due to the session control is based on SIP and SDP is a technologic characteristic of IMS, which support multiples kinds of access technologies [36], described back.

Although the protocols presented here have a common goal of location transparency, the best option will depend of the specific characteristics (like parameter and conditions of the mobility scenarios) that will be presents in different situations. For our specific topic, SIP is better than MIP and mSCTP because capable of supporting terminal mobility as well as session mobility, personal mobility and service mobility in the NG networks.

Chapter 3

HANDOFF MECHANISM ON WLAN AND GPRS

An important objective in the NG systems [34] and [40] is to support applications and services with performance and QoS equivalent or even better than those present in wireline networks, and also to improve the connectivity whit others wireless and wired systems.

In Chapter 2 we analyzed the protocols that can provide mobility over IP networks. Now, in order to understand the handoff mechanism on WLAN and GPRS technologies, it is necessary review the concept of wireless network and the principal characteristics of both architectures, we provide a detailed explanation of the process of handoff in both access technologies. Also we describe the traditional approaches to integrate different networks and the concept of Brokered Model. And as a final point, an example of vertical handover between WLAN and GPRS is described.

3.1 WIRELESS NETWORKS

Wireless network refers to any type of computer network that is wireless, and is commonly associated with a telecommunications network whose interconnections between nodes is implemented without the use of wires. Generally are implemented with some type of remote information transmission system that uses electromagnetic waves, such as radio waves, for the carrier and this implementation usually takes place at the physical level or layer of the network.

Mobile communication systems are divided in three generations. First generation cellular and cordless telephone networks are based on analog technology use *Frequency Modulated* (FM) modulation and *Advanced Mobile Phone Services* (AMPS). Second generation wireless system employ digital modulation and advanced call processing capabilities: GPRS -that is a prelude of third generation and called 2.5G-, GSM, *Time division Multiple Access* (TDMA), *Carrier Division Multiple Access (*CDMA), *Cordless Telephone for Second Generation* (CT2), *Personal Access Communications*(PACS) and *Digital European Cordless Telephone*(DECT). 3G is the *Universal Mobile Telecommunications System* (UMTS). The aim of third generation wireless networks is to

provide a single set of standards that can meet a wide range of wireless applications and provide universal access throughout the world and a universal personal communicator (a personal handset) will provide access to a variety of voice, data, and video communication services [13] and [36].

3.1.1 Wireless Network Architecture

In wireless network the mobile service area is covered in *cells* or coverage areas by a set of Base Stations (BSs). The BSs relay the calls to and from the *Mobile Stations* (MSs) that are within the cells. In Figure 3.1 is shown the basic architecture for a wireless network, where the BSs are connected to *Mobile Switching Centers* (MSCs) by land links. And the MSC is an end office as in the telephone system, and is in fact, connected to at least one telephone system end office. It interfaces the MSs (via BSs) with the *Public Switching Telephone Network* (PSNT). For roaming management are used two databases, the *Home Location Register* (HLR), and the *Visitor Location Register* (VLR).

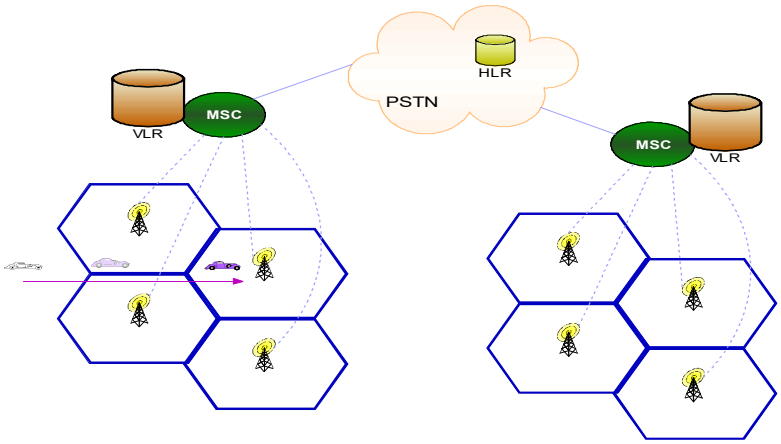

Figure 3.1. Basic Architecture in Wireless Network

Roaming occurs when a mobile user moves from one *Personal Communication System* (PCS) to another [26]; the system should be informed of the current location of the user. Otherwise, it would be impossible to deliver the service to the mobile user.

3.1.2 WLAN IEEE 802.11 Architecture

Wireless LANs offer the following productivity, service, convenience and cost advantages over traditional wired networks. In general WLANs have the following advantages [34]: Mobility, Installation Speed and Simplicity, Reduced Cost-of-Ownership and Scalability.

WLAN overview

An infrastructure 802.11 WLAN like that shown in Figure 3.2 is based on a cellular architecture where the system is subdivided into cells, where each cell is called Basic Service Set or BSS which is controlled by a *Base Station* (BS) also referred to as *Access Point* (AP).This BSS has a finite number of channels, where each channel is associated to a frequency. Here is a problem, the number of frequencies into a cell is limited, for that reason, the frequency reuse is the key mechanism that may to user of clusters different use the same frequency for establish the communication.

Even though that a WLAN may be formed by a single cell, with a single AP, most installations will be formed by several cells, where the APs are connected through some kind of backbone (without any particular technology –and can be wired to a wide range of mediums-) called *Distribution System* (DS). The integration of multiple BSSs using a DS is called an *Extended Service Set* (ESS), [12].

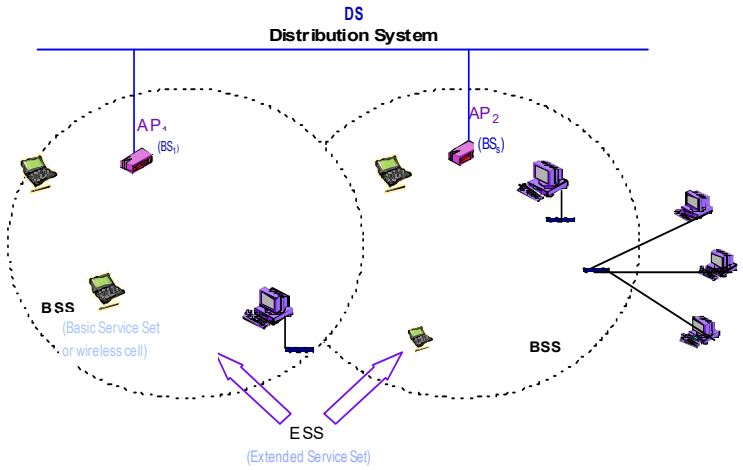

Figure 3.2 Infrastructure WLAN

WLANs operate on 2.4 GHz and 5 GHz unlicensed frequency bands. Because of the unlicensed nature of the bands, the transmission power of the devices is limited, resulting in limited range and coverage of WLAN cells. Thus, even a small hotspot place may require multiple access points for sufficient coverage [14]. A protocol view of the 802.11 protocol stack is given in Figure 3.3. The physical layer corresponds to the OSI physical layer fairly well [12], but the data link layer is split into two or more sublayers. The *Medium Access Control* (MAC) sublayer determines how the channel is allocated, therefore who gets to transmit next. Above it is the *Logical Link Control* (LLC) sublayer whose job is to hide the differences between 802.11 variants and make them indistinguishable as the network layer is concerned.

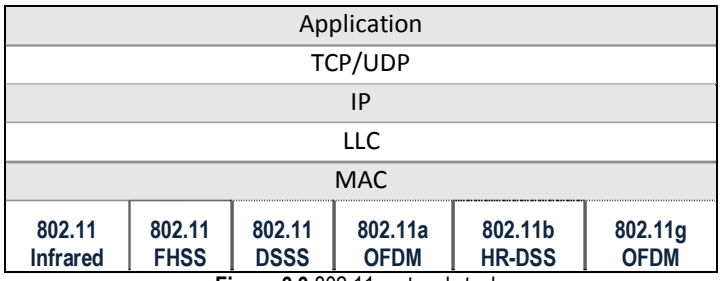

Figure 3.3 802.11 protocol stack.

The 1999 standard [32] specifies a single MAC which interacts with three transmission techniques allowed in the physical layer (all of them runs at 1 to 2 Mbps). The infrared method uses much the same technology as television remote controls do. The other two use short radio, using techniques *Frequency Hopping Spread Spectrum* (FSS) and *Direct Sequence Spread Spectrum* (DSSS). After, two new techniques were introduced to achieve higher data rate, these are *Orthogonal Frequency Division Multiplexing* (OFDM) that operate up to 54 Mbps and *High Rate Direct Spread Spectrum* (HR-DSS) runs at 11 Mbps.

3.1.3 GPRS System Architecture

In order to understand GPRS system architecture is helpful starts reviewing the architecture of GSM system.

GSM overview

In GSM system the mobile handset is called *Mobile Station* (MS). A cell is formed by the coverage area of a *Base Transceiver Station* (BTS) which servers the MS in its coverage area. Several BTS together are controlled by one *Base Station Controller* (BSC).The combined traffic of the mobile stations in their respective cells is routed through a switch MSC. Connection originating or terminating from external telephone (PSTN, ISDN or PDN) are handled by a dedicated gateway, *Gateway Mobile Switching Center* (GMSC) [12] and [13]. Figure 3.4 shows the block diagram of the GSM system architecture.

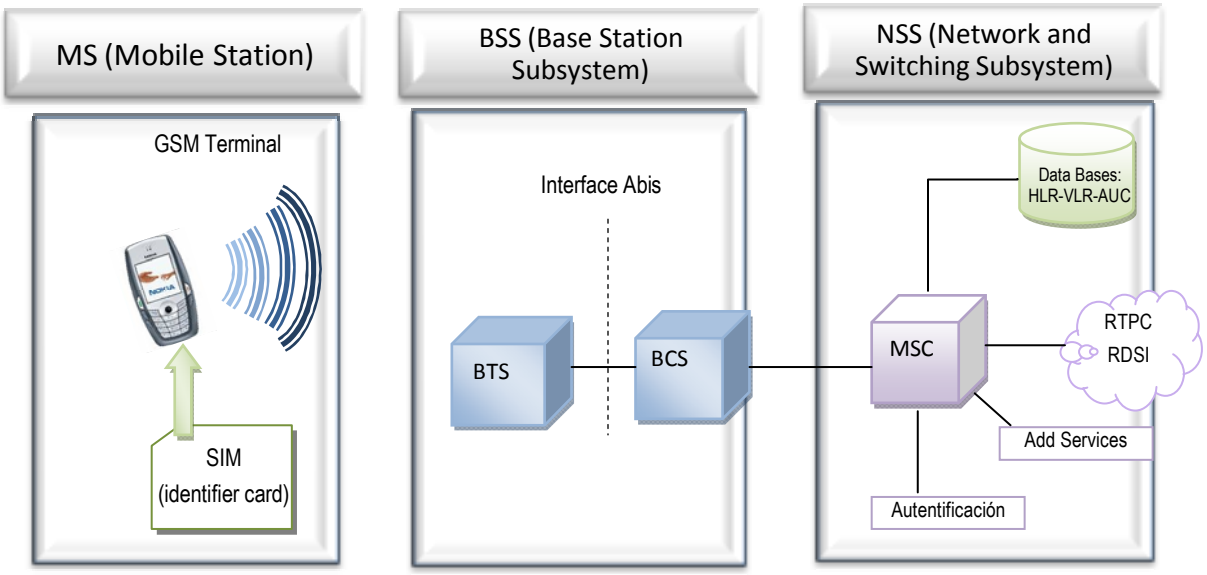

Figure 3.4 Basic Architecture in GSM.

GSM system architecture consists of three interconnected subsystems that interact between themselves and whit the users through the following network interfaces [12]:

- ***Base Station Subsystem*** *(*BSS). The BTS and BSC together form a BSS that also known as the *radio subsystem.*
- ***Operation Support Subsystem*** (OSS). Supports the operation and maintenance of GSM and allows system engineers to monitor, diagnose, and troubleshoot all aspects of the GSM system.
- ***Network and Switching Subsystem*** (NSS). Manage the switching functions of the systems and allows the MSCs to communicate with other networks managing and providing external access to several customer databases. NSS manage three different databases: *HLR which s*tores the permanent (such as user profile) as well as temporary (such as current location) information about all users registered whit the network; *VLR* in charge of stores the data about the users who are being serviced currently, including the data stored in HLR for faster access as well as the temporary data like location of the user; and the *Authentication Center* (AUC) that stores the authentication information of the user such as the keys encryption.

GPRS overview

The GPRS is an evolution of GSM mobile telephony system [48], which offers important enhancements to the transmission and is a standard of transition to 3G system. Adds switched packet in all levels of GSM network (radio, switched nodes, transmission network, etc.) through adds new functional entities (network nodes) to optimize the use of radio channels for the burst traffic (e.g. Internet traffic) and to use efficiently the network resources. Therefore, is possible to reach to bigger data rate than GSM system.

The network nodes added are called *GPRS Support Nodes* (GSNs) and are responsible for the routing and delivery of the packets data to and from the MS and external *Public Data Networks* (PDN) [49]. The **three most important new elements GPRS** for the switched packets (included the GSNs) added to the existing GSM networks are:

- The ***Serving GSN*** (SGSN) which is responsible of the packets movement from and to the GPRS network service geographic area. Rather, SGSN is a charge of routing the packet switched data to and from the MS within its area of responsibility. The main functions of SGSN are packet routing and transfer; mobile attach and detach procedure (*Mobility Management* (MM)); location management, assigning channels and time slots (*Logical Link Management* (LLM)); and authentication of charging for calls. The location register of the SGSN stores location information (e.g., current cell, current VLR) and user profiles (e.g., *International Mobile Subscriber Identity* (IMSI), addresses used in the PDN) of all GPRS users registered with this SGSN.
- The ***Gateway GSN*** (GGSN) which acts as an interface between the GPRS backbone and the external PDN like the Internet. It converts the GPRS packet coming from the SGSN into proper *Packet Data Protocol* (PDP) format (i.e. X.25 or IP) before sending to the outside data network. Similarly it converts the external PDP addresses to the GSM address of the destination user. It sends these packets to proper SGSN. For this purpose the GGSN stores the current SGSN address of the user and his profile in its location register. The GGSN also performs the authentication and charging functions. In general there may be a many to many relationship between the SGSN and GGSN. However a service provider may have only one GGSN and few SGSN due to cost constraints. A GGSN proved the interface to several SGSNs to the external PDN.
- The ***Border Gateway*** (BG) which bring access to other GPRS networks. BG interconnected the GSNs of different operators of mobile network (roaming) or the same operator in distinct countries by security and interoperability.

The **modification to the GSM architecture** included principally:

- ***MSC/VLR,*** this is to charge of telephonic commutation of circuits in GSM system, too connect directly to SGSN through the interface $\mathbf{G_s}$(coordinate information of MS localization) and indirectly by mean of BSS using the interfaces A y $\mathbf{G_b}$. The SGSN service area is divided in a determined *Routing Areas* (RA) for GPRS network. The RA is minor or equal (subgroup) than the *Localization Area* (LA) of MSC. The VLR contains temporary information for supply services at the MS located in LA of MSC or in RA of SGSN.
- ***HLR,*** that contains GSM/GPRS subscriber information, like: IMSI which is a unique identifier allocated to each mobile subscriber; IP address of the SGSN where is located at present the MS; and PDP context register (where each subscriber will be able to have one or several registers).
- ***AUC,*** that provide to user authentication keys in GSM or GPRS. Also EIC refers to that in any connection GSM o GPRS is verifies the International *Mobile Equipment Identity* (IMEI) of the terminal.
- ***BSS*** is a shared resource between the GSM *Circuited Switched* (CS) system and the GPRS *Packet Switched* (PS) system. In BTS is added software *Channel Control Unit* (CCU) which supports new codification schemes. The BSC has new hardware and software elements: the *Packet Control Unit* (PCU), responsible of layers *Radio Link Control* (RLC) and MAC; and functionality of establish, supervise and disconnect the connections CS and PS. The new *Abis* interface is an interface between BTS and BSC.
- In the ***MS*** is added hardware and software that supports GPRS.
- Include the next *interfaces*: ***interface Gn*** between commutation nodes (data and signaling over IP); *interface* $\boldsymbol{G_b}$ between the radio subsystem and SGSN (interface open between the PCU and SGSN); ***interface*** $\boldsymbol{G_i}$ between GGSN and external internet network; ***interface Gp*** between different GPRS networks (it permit roaming through maintained established connections); ***interface*** $\boldsymbol{G_r}$ between SGSN and HLR for authentication and user profiles; ***interface*** $\boldsymbol{G_d}$ receives and send *Short Messages Service* (SMS) through radio channels; interface Gs used for treat efficiently MS connected to GSM and GPRS traffic.

The ***GPRS signaling*** includes protocols for control and support of transport functions, which ought to control: the connection and its attributes to access GPRS networks; the attributes of the access connection to an established network, like address PDP activation; the connection path for bring mobility to user; and the assignation of network resources.

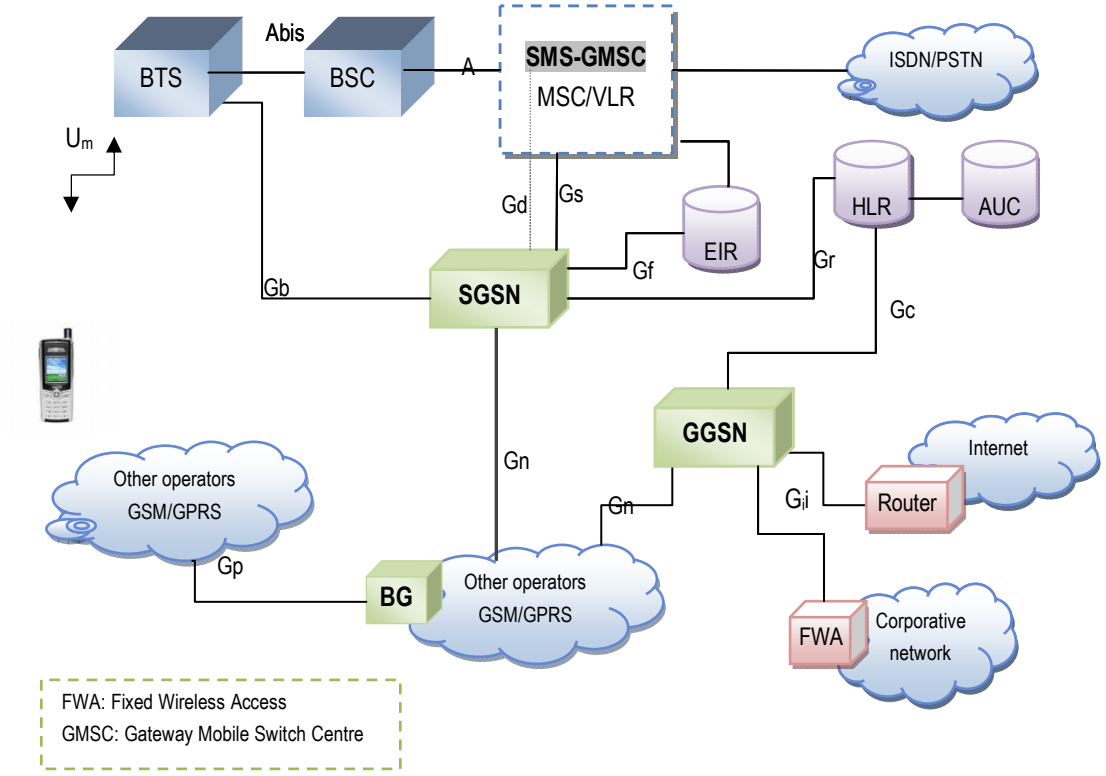

Figure 3.5 Basic Architecture of GPRS based on GSM and connection to other networks.

The signalling between the MS and SGSN is based on LLC. The Figure 3.5 Basic Architecture of GPRS based on GSM and connection to other networks. The signaling includes protocols for control and support of transport functions, which ought to control: the connection and its attributes to access GPRS networks; the attributes of the access connection to an established network, like address PDP activation; the connection path for bring mobility to user; and the assignation of network resources. SGSN-GGSN has signaling *GPRS Tunnelling Protocol* (GTP) over UDP/TCP, and *Mobile Application Part* (MAP) for signalling between SGSN and HLR.

To finish is important to do mention that GPRS networks can be divided in external networks and internal networks. Like is shown in the Table 3.1

Table 3.1 Types of GPRS networks.

<table>
<tr><th colspan="3">EXTERNAL NETWORKS</th></tr>
<tr><th colspan="2">IP Network</th><th>External data networks</th></tr>
<tr><td colspan="2">The GPRs network can be consider like a IPsubnet The MS are accesibles when acquires a IP address.</td><td>Transparent, where the MS obtains a IP address that belong to the GPRS operator addresses range. This address is assigned at moment that is activated dynamically the context PDP.</td></tr>
<tr><td colspan="2">Access Point Name (APN) is using with subscriber user information and node information, for consult the DNS and obtain GGSN's IP address that permit to connect to the user.</td><td>No transparent, where the MS obtains a IP address that belong to Intranet or ISP space addressing.</td></tr>
<tr><td colspan="2">"<network ID>.mnc.<MNC>.mcc.<MCC>.gprs"</td><td rowspan="2">This option requires communication between GGSN and address server (HDCP or RADIUS) belong to this correspondent Intranet or ISP.</td></tr>
<tr><td>-network ID-</td><td>-operator ID-</td></tr>
<tr><th colspan="3">INTERNAL NETWORKS</th></tr>
<tr><th colspan="2">SS7 network</th><th>GPRS backbone network</th></tr>
<tr><td colspan="2" rowspan="2">The network that support signaling GSM Secure Signaling (SS) Nº 7. It permits cooperative interworking between NSS entities from different GSM networks. Also transport the signaling within of commutation subsystem and network.</td><td>Intrar-PLMN: IP network that interconnect GSNs in the same PLMN.</td></tr>
<tr><td>Inter-PLMN: IP network that interconnect: GSNs belong to the same operator in countries different and Intra-PLMN networks of operators distinct, through Gp</td></tr>
</table>

3.2 HANDOFF MECHANISM

Handoff is too referred to as handover or automatic link transfer is the mechanism by which an ongoing connection between a MN and a CN or is transferred from one access point to the fixed network to another [1] when the quality of the connection is insufficient. In cellular voice telephony, such points of attachment are referred to as BSs and in WLAN terminology these points are called *access points* (APs). Figure 3.6 depicts the handover mechanism.

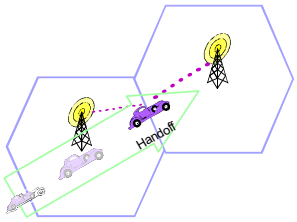

Figure.3.6 Handover Mechanism.

Handover is extremely important in a mobile network because of the default cellular architecture employed to maximize spectrum utilization and it is a key for roaming management in wireless networks [26]. There are two types of handover [44] according with the IETF draft:

- **L2 (Layer 2) handover:** A process by which the MN changes from one link-layer connection to another. For example, a change of wireless AP.
- **L3 (Layer 3) handover:** Occurs when a MN detects a change in an on-link subnet prefix that would require a change in the primary care-of address. For example, a change of access router subsequent to a change of wireless AP.

There are a variety of issues related to HO[3][21][25][28][29][33][34][42]and [44], these issues are divided into *two categories* [12]:

1. ***Architectural issues*** which are those related to the methodology (hard, seamless, soft), control (network controlled, mobile controlled) and software where hardware elements involved in rerouting the connection; and,
2. ***Decision time algorithms*** which are related whit the handoff metrics (RSS, path loss, BER, SIR, etc.) and performance evaluated methodologies (call blocking, HO rate, delay, etc.) and take like parameters the hysteresis margin, speed, distance, etc.

Also, handover can be classified into homogeneous and heterogeneous handover. Heterogeneous handover includes movement between various types of wireless technologies and different administrative domains [3]; consistently it is a L3 handover.

Handoff in various network technologies is different, to illustrate the similarities and differences about handoff in WLAN IEEE 802.11 and GPRS both wireless technologies in follow.

3.2.1 Handoff in 802.11 WLAN

The WLAN specification handles mobility management in a simple way. It defines only the over-the-air interactions (communication between MNs and the AP) [10]. The internals of how the ESS should be formed are left to the AP management entity and are not defined jet, therefore there are not distinguishing definitions of location management and handover management. According with standard IEEE 802.11 the HO procedures in a WLAN are depicted in Figure 3.7.

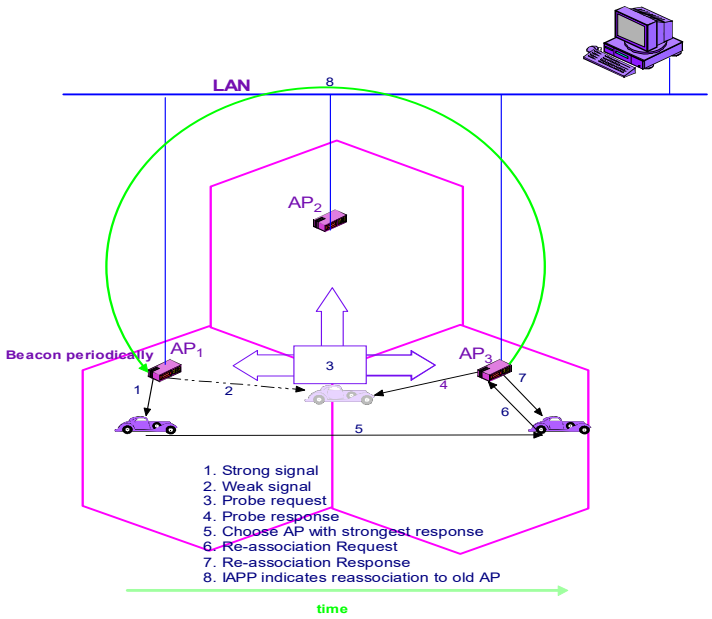

Figure 3.7 Handoff procedures in IEEE 802.11 WLAN.

The handoff procedure in WLAN is as follow:

1. The AP broadcasts a beacon signal periodically (typically the period is around 100 ms). A MN that powers on scans the beacon signal and associates itself with the AP with the *strongest beacon***.** The beacon contains information corresponding to the AP such as a timestamp, beacon interval; capabilities, ESS ID, and *Traffic Indication Map* (TIM) this information in the beacon to distinguish between different APs.
2. MN keeps track of the *Received Signal Strength* (RSS) of the beacon of the AP with which it is associated and *when the RSS becomes weak,* it starts to scan for stronger beacons from neighboring APs.
3. The scanning process can be either active or passive. In passive scanning, the MN simply listens to available beacons. In active scanning, the MN sends *a probe request* to a targeted set of APs that are capable of receiving its probe.
4. Each AP that receives the probe responds with *a probe response* that contains the same information that is available in a regular beacon with the exception of the TIM. The probe response thus serves as a solicited beacon.
5. The mobile *chooses the AP* with the strongest beacon or probe response and;
6. Sends a *re-association request* to the new AP. The re-association request contains information about the MH as well as the old AP.
7. In response, the new AP sends a *re-association response* that has information about the supported bit rates, station ID, etc. needed to resume communication.
8. The old AP is not informed by the MN about the change of location.

Like was described before, the IEEE 802.11 standard addresses only the "over-the-air" transmissions and the *Internet Access Point Protocol* (IAPP) is needed for completing the handoff procedure over the wired portion of the network [32]. The working group IEEE 802.11f introduces IAPP to guarantees AP interoperability, when Handover occurs. IAPP [22] is used even if the APs do not belong to the same manufacturer, considering that the APs belong to the same ESS. An IAPP packet is transported either by TCP or UDP, which announces the displacement of mobile nodes [11] and [31].

3.2.2 Handoff in GPRS

GPRS uses exactly the same physical radio channels as GSM, and only new logical GPRS radio channels are defined. Physical channels are taken from the common pool of available channels in the cell. Allocation to circuit switched services and GPRS is done dynamically according to the capacity on demand principle. This means that the capacity allocation for GPRS is based on the actual needs for packet transfers. GPRS does not require permanently allocated physical channels. However, the operator can dedicate some physical channels for GPRS traffic.

Logical network support nodes (GSNs) are used for packet routing in the backbone. The GGSN acts as the interface to public data networks such as Internet and contains the routing information to be used to tunnel packets to the MN through a SGSN which is responsible for location management and delivery of packets.

GPRS HO procedure, or mobility management can be categorized as a set of the following operations [12]:

1. ***Mobile Attachment*.** In the attachment procedure the MS is authenticated and ciphering mode for data communication is initiated.
2. ***PDP Context Activation*.** As result of this procedure, a LLC context, including a temporary logical link identity, is established between the MS and the SGSN.
3. ***Location Management.*** To be able to communicate, the MS has to activate a PDP context for one or more packet data protocols. If the access is permitted, SGSN informs the GGSN to update the PDP context for MS.

3.2.3 Comparison between both handoff procedures

In order to clarify the handoff mechanism on WLAN and GPRS technologies is shown a comparison of handoff procedures in WLAN IEEE 802.11 and GPRS. Even though the functionality of IEEE.802.11 and GPRS have networks technologies different, the HO procedures

have several similarities that are summarized by Pahlavan [12] and only that have interest in this work are showed in Table 3.2.

Table 3.2 Comparison of handoff procedures.

IEEE 802.11	GSM/GPRS
Beacon is on the same physical channel as data	Beacon (BCCI) is on a separate physical channel from data traffic
Decision on handoff is made at the mobile terminal	Decision on handoff is made at the base station controller or mobile host
IAPP protocol to inform old AP about handoff	SGSN updates GGSN in GPRS
The multiple access is CSMA, and the channel is monitored all the time before packet transmission	The multiple access is TDMA-base, and channel monitoring times when the MN does not transmit or receive
Channel monitoring at the terminal	Channel monitoring at the terminal

3.3 INTEGRATED ARCHITECTURES

3.3.1 Traditional Integrated Model

Currently, standard organizations have started the standardization of the integration of WLANs and 3G/GPRS. In [3] and [38] the *3GPP Partnership Project* (3GPP) defines the requirements, principles and interworking scenarios for the integration of WLAN and 3GPP networks. The integration is classified in *tight coupling* and *loose coupling* (Figure 3.8).

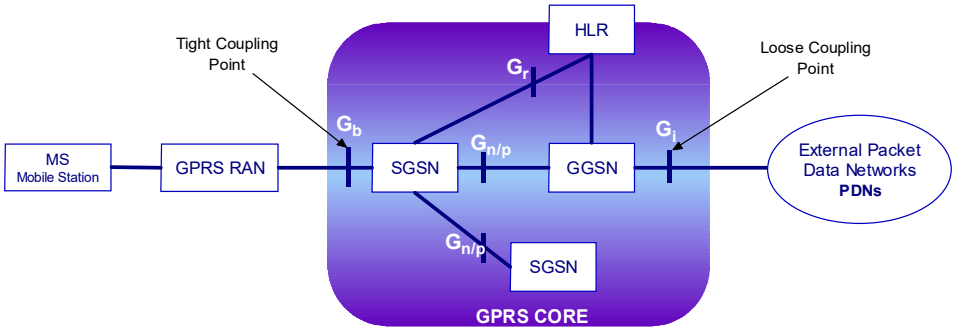

Figure 3.8 Tight and Loose coupling.

Tight coupling

The rationale behind the tight coupled method is to make the WLAN network appear to the 3G core network as another 3G access Network [52]. Set WLAN as an alternative RAN and uses a gateway between the WLAN and the 3G core network, WLAN is connected with a standard GPRS interface **G_b.** The AP of a WLAN can be regarded as a BS and is connected to SGSN through a GIF. In this approach the WLAN data traffic goes through the GPRS core network before reaching the external *Packet Data Networks* (PDNs).

Provides firm coupling between WLAN and 3G, and its main advantage is enhanced mobility across the two domains. Also, offers reuse of 3G authentication, authorization and accounting, and protects the operator's investment by reusing the 3G core network resources, subscriber. These networks would share the same authentication, signaling, transport and billing infrastructures, independently from the protocols used at the physical layer on the radio interface. Generally used for WLANs owned by cellular operators and cannot easily handle third party WLANs. There is also some cost concerns related to tight coupling [44].

Loose coupling

Like the previous architecture, the loose coupled approach calls for the introduction of a new element in the WLAN network, the WLAN gateway which connects to the Internet and does not have any direct link to 3G network elements such as *Packet Data Switch Networks (*PDSNs) or 3G core network switches [52]. Uses WLANs as complementary networks to 3G/GPRS systems and is connected by GPRS interface $\mathbf{G}_i$. In this case, GPRS and WLANs could be two parallel networks and work independently. With loose coupling the WLAN bypasses the GPRS network and provides direct data access to the external PDNs. It is expected that loose coupling will be deployed earlier than tight coupling due to the architecture complexity in tight coupled approach.

It allows the independent deployment and traffic engineering of 802.1 and 3G networks. 3G carriers can benefit from other providers' 802.11 deployments without extensive capital investments. At the same time, they can continue to deploy 3G networks using well established engineering techniques and tools. Also, *through roaming agreements with many partners can result in widespread coverage,* including key hot spot areas, subscribers benefit from having just one service provider for all network access [52], therefore no longer need to creates separated accounts with providers in different regions, or covering different access technologies.

In a loosely coupled system, *the Internet is used as the traffic backbone.* Therefore the home service operators would not have complete control over the visited network, and exist a fear that consistent quality might not be provided.

Comparison of Loose and Tight coupling

Tight coupling offers faster handoffs and high security mechanisms but also requires combined ownership of the two networks. Loose coupling has low investment costs and permits independent deployment and traffic engineering of WLAN and 3G networks. It is expected that

loose coupling will be deployed earlier than tight coupling due to the architecture complexity in tight coupled approach [35].

3.3.2 Integration through a Brokered Model

The Brokered Model [39] is a model that can be adopted for loose and tight coupling for integrated heterogeneous networks, which have added an entity what take the role of an active intermediary amongst both networks. This entity is the key of model and is called broker which is also known like an interworking gateway or in some occasions, wireless internet services provider aggregator.

In this model, the *broker* is a roaming intermediary who *is mainly responsible for developing roaming agreements with individual access points or other service providers* to its subscribers.

In the next section is described a form to integrate IEEE 802.11 and GPRS technologies proposed by Pahlavan and Krishnamurthy in [12] using a central authority but under a common ownership service provider.

3.4 HANDOFF BETWEEN WLAN IEEE 802.11 AND GPRS NETWORKS

Heterogeneous handover includes movement between various types of wireless technologies and different administrative domains also is a type of handover that requires authorization for acquisition or modification of resources assigned to a mobile and the authorization needs interaction with a central authority in a domain. In many cases an authorization procedure in a heterogeneous handover follows an authentication procedure that also requires interaction with a central authority (or proxy server) in a domain [3], [10] and [38].

A handoff between and WLAN IEEE 802.11 GPRS belong to a heterogeneous handover which is a type of inter-technology handover called vertical handover since the mobile makes movement between two different cell sizes.

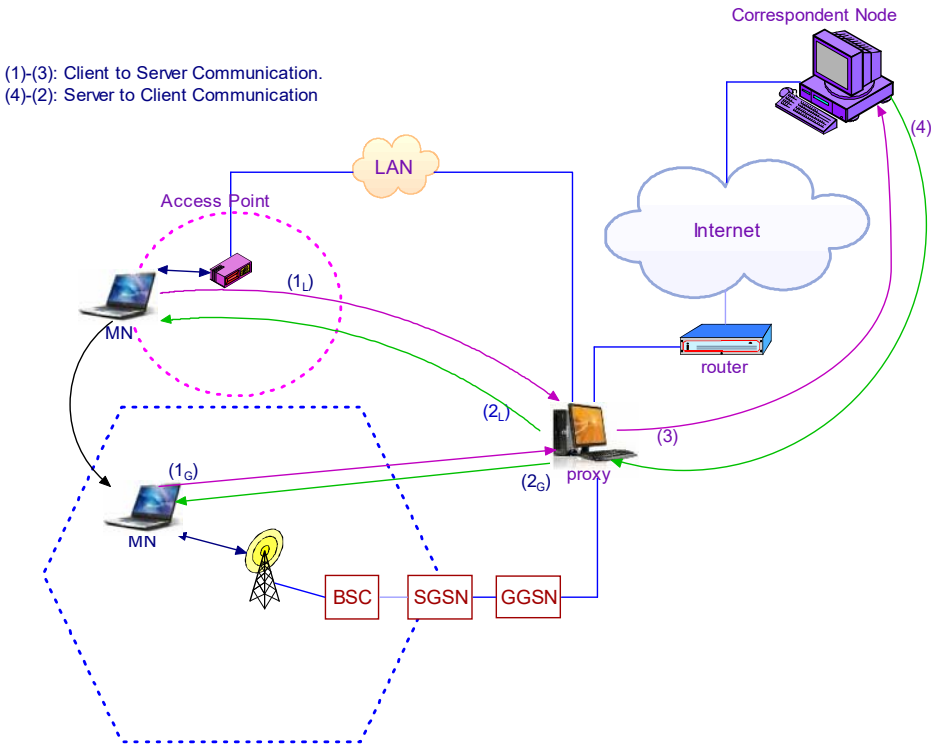

Figure 3.9 An upward vertical handover from WLAN to GPRS.

A *vertical handover* [3] can be termed as upward vertical handover or downward vertical handover based on the direction of movement such as smaller cell to larger cell or vice versa. An upward vertical handover between the technologies reviewed will be described, that is the MN which belong to WLAN moves its point of attachment towards GPRS.

In Figure 3.9, the upward vertical handover occurs [10], [12] and [25]. An intermediate server is placed in the network so that any traffic to and from the mobile host is forced to pass through it. Consequently, it is possible for this entity to perform certain functionality's that may be required on behalf of the MN in a manner that is transparent to the rest of the network. All the elements which interact in this model are controlled by unique service provider.

When the MN is attached to an AP (is thus connected to a WLAN), the communication path between the MN and CN on the Internet will be (1L)-(3). The CN-MN communication path will be (4)-(2L). When the MN is on the GPRS network, these paths will be (1G)-(3) and (4)-(2G) respectively. It should be observed that the segments (3) and (4) in any of the paths do not change regardless of where the mobile host is located. Only the links (1) and (2) will be continually changing depending on the movement of the MH.

Clearly then, only the communication between the MN and the *proxy server* (PS) alone is subject to changes whatever they may be. Mobility is supported by allowing the central-authority-mobile connection to change while maintaining the central-authority-CN connection unchanged. The changes that are needed are with respect to the communication protocols between the MN and the central authority. Both the MN and the central authority are presumably under common ownership and hence it will be quite easy to tune the required characteristics to the specific needs of the users of that system [25] and [38].

Coinciding with the vision of the NG networks, IP technology will provide transparent handovers across heterogeneous access networks such as 802.11 and GPRS considering that each access network has different QoS, security and bandwidth characteristics. Similarly movement between two different kinds of domains (macro mobility) poses a challenge since a mobile will need to re-establish authentication and authorization as well in the new domain and each administrative domain may or may not have any prior security agreement.

As was mentioned above, loose and tight coupled model described two manners to integrate both technologies, but Pahlavan [12] shown that there are several advantages to employing a central authority in an upward vertical handover. This kind of architecture is scalable. Central authorities are already in place in many organizations as firewalls or web caching servers. These may be reused for MM and upwards vertical handovers.

If the proxy and both kind of networks are under the control of the same organization that owns the MNs, the solution can be closed compared with the same architecture model but with different providers. This is, if the VN (or WLAN) are under a WISP, the HN under control of other provider (own GPRS) and a thirdly party manages a central authority.

Chapter 4

ROAMING AND MOBILITY

Roaming is defined as a "set of formal agreements between operators that allows a mobile node to get connectivity from a foreign network" [16]. Roaming is the process whereby a user moves into a visited domain. Usually the *user's home domain* maintain a service subscription account, and *user´s visited domain* does not have an account of a user moves into this domain (see Figure 4.1). Therefore, it is necessary to have capabilities to support roaming like:

- Network access control for visiting mobiles.
- Roaming agreements between the mobile´s home domain and the visited domains.
- Session continuity while a user crosses domain boundaries.

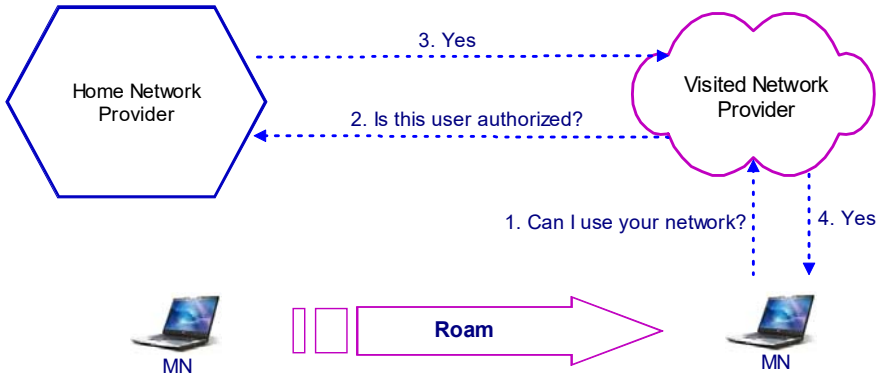

Figure 4.1 Roaming.

This chapter describes roaming and mobility for WLAN and GPRS networks, also presents an overview about integration architecture for both technologies and afterwards, it introduces some interesting solutions that currently exist to solve the problem concerning roaming and mobility management for heterogeneous networks.

4.1 ROAMING AND MOBILITY IN WLAN

There are no distinct definitions of location management and handover management in WLAN IEEE 802.11 like was mentioned in section 3.2.1, therefore roaming management and agreements between services providers are a priority requirement for wireless networks. Although a subscription to any available *Wireless Internet Service Provider* (WISP) might to user access virtually to any service.

In the case of WLANs, the importance of roaming is even higher than in mobile networks. This is due to the following reasons: The use of unlicensed frequency bands limits the number of operators in one site. Usually, only one network can be deployed in a single location; and coverage of the WLAN access point is small, making its costly to build and operate a wide network.

Roaming agreements can be used to enable subscribers of one operator to access their services using networks of other operators. A number of different roaming models exist, including bilateral agreement, clearinghouse, and roaming Brokered Models. A technical solution for roaming in WLAN is showed in the Figure 4.2 [14]. The architecture can be used to provide roaming between all the players in the public WLAN market, including mobile operators, and site owners. Regardless of the roaming model used, the roaming architecture is based on *Authentication, Authorization, and Accounting* (AAA) servers, that proxy the AAA information between each other.

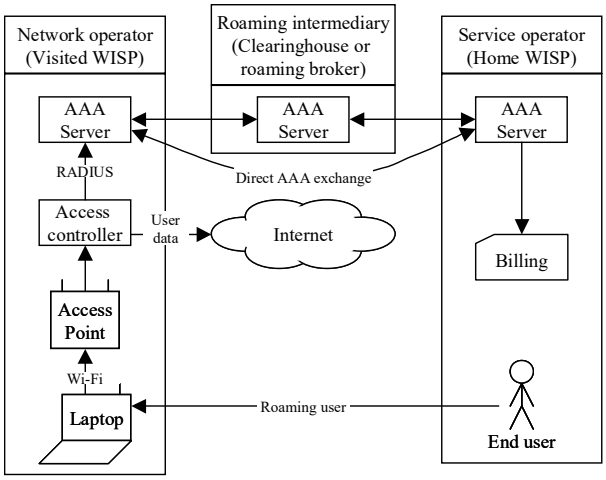

Figure 4.2 WLAN roaming architecture.

The coverage offered by WLANs is quite limited and lacks roaming support. The complementary characteristics of 3G cellular systems (slow, wide coverage) and WLAN (fast,

limited coverage) make it attractive to integrate these two technologies to provide ubiquitous wireless access.

4.2 ROAMING IN GPRS

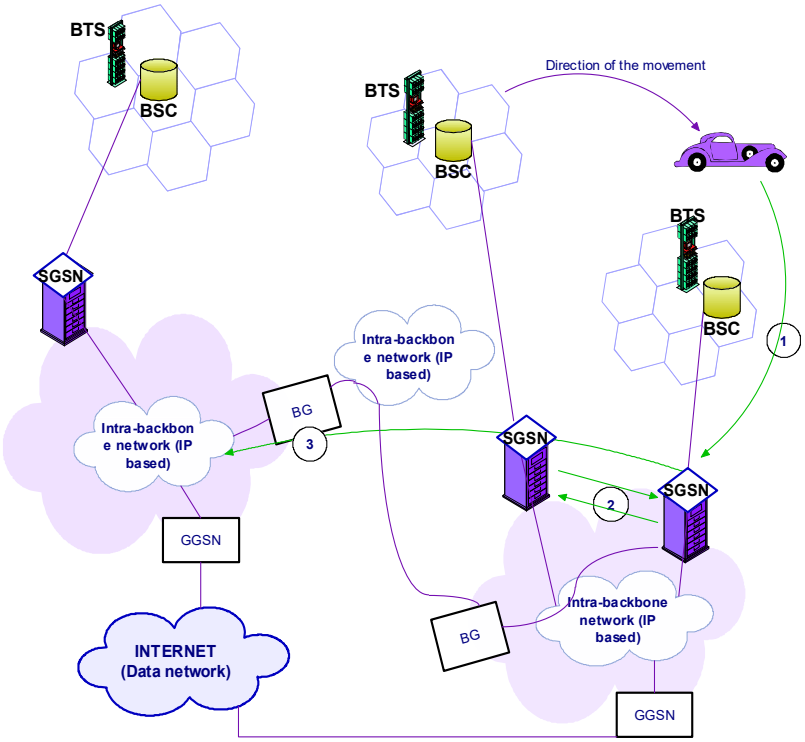

Figure 4.3 Handoff procedures in GPRS.

When a MN is roaming into another *Public Land Mobile Network* (PLMN) called *Visited PLMN* (VPLMN), the MN has to first attach to the network. In GPRS, the attach MN informs SGSN its willingness to connect with the network. The MN reports information about its identity, capability and location to the SGSN. SGSN then checks the MS's identity and does the authentication procedures to be able to secure the transmission path. The attach procedure is completed after SGSN has received the roaming subscriber data from HLR of the MN's *Home PLMN* (HPLMN) and finished the location update procedure.

After GPRS attach the MS send an Activate PDP Context Request to SGSN. GPRS subscriber data contains one or more *Packet Data Protocol* (PDP) contexts per *International Mobile Subscriber Identity* (IMSI), which explicitly identifies the subscriber. The PDP context contains the type and address of the PDP (e.g. IP address), QoS profile subscribed, a record which specifies whether the MS is allowed to use the *Access Point Name* (APN) in the domain of the HPLMN only, or additionally the APN in the domain of the VPLMN.

The location is updated with a routing update procedure [12], as shown in Figure 4.3, MS sends *Routing Area* (RA) update request containing the cell identity and the identity of previous routing area, to new SGSN (**1**). The new SGSN asks from old SGSN the context (GGSN address and tunneling information) of the MS (**2**). The new SGSN updates GGSNs, new SGSN address and tunneling information is delivered to GGSN (**3**). The new SGSN updates HLR. The HLR cancels the MS information context in old SGSN and loads the subscriber data to new SGSN. The new SGSN acknowledges to the MS. The previous SGSN is requested to transmit the undelivered data to the new SGSN.

There are two basic architectures in roaming. First, the packets could be routed via GGSN of the VPLMN through the public Internet to the HPLMN GGSN using the $\mathbf{G_i}$ interface. The alternative way is to use inter-PLMN backbone and $\mathbf{G_p}$ interface or and *Border Gateways* (BGs), can you view the Figure 3.5.

Public Internet and G_i interface

The GPRS offers either direct transparent access to the Internet or non-transparent access. In the transparent case the MS is given an address that belongs to the operators addressing space. The address is given either at the subscription in which case it is a static address. If the address is given in the PDP context activation by GGSN, it is a dynamic address. If the subscriber is allowed to use the GGSN of the VPLMN, she could have a direct access to Internet or maybe Intranet of her company.

Inter-PLMN Backbone and G_p interface

When a subscriber is roaming into another PLMN, she may activate a PDP Context in a GGSN belonging to the HPLMN. In that case the traffic is then transmitted through from SGSN in visited PLMN via the BGs to the GGSN in the home PLMN. The GTP tunnel is then setup between these nodes. The data is transmitted in the tunnel over the visited intra-PLMN and over $\mathbf{G_p}$ interface to the inter-PLMN backbone network and finally over the home intra-PLMN backbone to the home GGSN. The home GGSN routes finally the packets to their destiny.

4.3 ROAMING THROUGH A BROKER

According to the classification of the model composition across multiple providers [14] [38], the model used for achieve the interworking between two networks with a different *Internet Service Provider* (ISP) is a Brokered Model. Where the *roaming broker component* (RB) is

responsible to coordinate communication as well as establish settlements independents with both ISP in the distinct technologies. The Figure 4.4 showed a roaming Brokered Model.

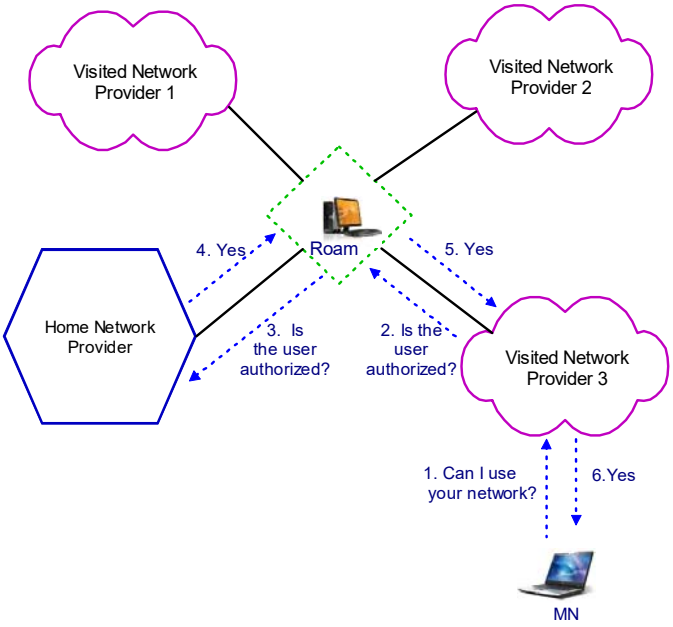

Figure 4.4 Roaming Brokered Model.

4.4 CURRENTLY SCHEMES IN STOCK FOR ROAMING AND MOBILITY

A lot of recent works have focused on the design and evaluation of architectures to support vertical handover and to integrate 3G and WLAN networks. Some of this works that are presents important contributions for this research are mentioned in follow.

4.4.1 VHE

Other solution that offers personalized services to the user and mobility management between different IP domains was proposed by Octavio Ramírez in "VIP (VHE in mobile Networks) Architecture [11]. Wherefore the main goal is to bring the VIP architecture closer to the GSM networks, based on LDAP and RADIUS services. *Virtual Home Environment* (VHE) is employed for the transportation of personalized services (user´s profiles) across different networks. VHE [17] is defined as a system concept for personalized service portability across network boundaries and between terminals. VHE is usually associated with mobile IP networks. The concept of the VHE is such that UMTS users are consistently presented with the same personalized features, user Interface capabilities and services in any network and anything terminal, where ever the user may be located. With VHE the visitor network is able to emulate the behavior of the user´s HN. Thus the user obtains the same services that they have at the HN.

4.4.2 Telia Sonera

This model uses basically the concept of Public WLAN value system introduced by Timo Smura [14] where roaming brokers bought the capacity from the network operators and resell capacity to service operators. This type of model is based on the concept of thirty parties.

TeliaSonera Finland acts as WISP in the public WLAN market, offering services in its own hotspot networks. The company offers both UAM and SIM-authentication methods. In addition to the hotspots in Finland, Sonera HomeRun customers can use the Telia HomeRun hotspots located in Sweden, Norway, and Denmark, as well as in certain airports in Europe and in the USA. TeliaSonera Finland has also made roaming agreements with several European operators.

4.4.3 UnyFy

Alessandro Ordine et. al. [23], proposed a SIP roaming solution amongst different WLAN service providers based on an entity called Uni-Fy which is a Wireless LAN/HotSpot management system with distributed authentication, access and policy control, and other capabilities. Authentication and authorization functions are implemented at application layer, while access control is applied at IP layer by means of firewalling capability. The overall scheme can be view as a captive portal implementation. SIP-based authentication is provided end-to-end between user-to-network and network-to-network. The proposed solution realizes full proxy-to-proxy authentication at SIP level, enabling dynamic and secure WISP-to-WISP interworking.

4.4.4 Roaming in heterogeneous networks

Enabling roaming in heterogeneous multi-operator wireless networks [16], was proposed by Oscar Salazar, where present a SIP based roaming architecture to enable service mobility between cellular network operator and unlicensed wireless networks through use of SLA monitoring and enforcement, which have a broker based access control bring the service mobility in heterogeneous wireless networks.

4.4.5 UMA

Unlicensed Mobile Access (UMA) technology [20] is the 3GPP standard for *Fixed- Mobile convergence* (FMC). UMA is based on *Generic Access Network* (GAN) that provides access to GSM and GPRS mobile services over unlicensed spectrum technologies, including Bluetooth and 802.11. By deploying UMA technology, service providers can enable subscribers to roam and

handover between cellular networks and unlicensed wireless networks using dual-mode mobile handsets. With UMA, subscribers receive a consistent user experience for their mobile voice and data services as they transition between networks.

4.4.6 Comparison between contributions

The existence of many incompatible wireless systems makes difficult to roam from one technology to another. Currently there is not uncomplicated solution for mobility management requirements and the heterogeneity of NG wireless system. Various approaches from multiple angles have been proposed to achieve it towards a complete solution. Each approach has pros and cons and is probably not enough by itself. Before finished this chapter the Table 4.1 illustrates an important features comparison between the traditional approaches described up.

Table 4.1 Comparison of schemes in stock.

Scheme	VHE	TeliaSonera	UniFy	Heterogeneous	UMA
Main Objective	Personalization of the service environment while the user is roaming between different networks and using different terminals.	Achieve an international roaming based on *SLAs* between the different WISP that exists in the world	Open solution for secure authentication in wireless (also wired) access scenario based on a distributed AAA architecture and on SIP protocol	Enabled roaming between heterogeneous networks	Management seamless roaming and handover between heterogeneous networks using dual-mode mobile handsets
Roaming	Used for bring roaming to user provided it is part of the service profile agreed with SP.	Wide international coverage through roaming agreements	Fully compatible with present and future 3G systems	Based on roaming brokered and settlements (SLAs) amongst finishes networks operators and the broker.	Transparent to the subscriber.
Handover	Not supported	Not supported	Not Automatic	Automatic	Automatic
Advantages	Service portability and session mobility.	Possibility for innovative business models exists.	Open solution, a client will be able to access several WLANs based on the use of standard VoIP or instant	Competent to facilitate an advanced mobility management scenario	All services can be ported on WLAN within several changes Seamless
Disadvantages	Need to adapt the QoS to the level supported by the terminal	Lack of roaming agreements amongst finish WLAN operators.	Its architecture that ought to be implemented on the mobile nodes	Is more of a conceptual model rather than a mature solution, although extensions of SIP (or SIP based solutions) are a promising approach.	Not IP based. Several security layers: WLAN Sec, IPSec, GPRS sec

Although terminals and devices are increasingly capable of physically communicating using different access technologies, interconnectivity and cooperation between them is still a largely unexploited resource since procedures and protocols are either incompatible or their use is quiet by business related barriers.

The contributions reviewed in this chapter are valuable for service mobility; some of these operate under tightly coupled network architectures or under the assumption that the unlicensed wireless networks are managed by the same operator. Unlike the tightly coupled approach, loose coupling allows a wireless ISP to provide its own public 802.11 hot spot, interoperate through roaming agreements with public 802.11 and 3G service providers, or manage a privately installed enterprise Wireless LAN.

In general, the best choice of architectures should be decided by a couple of factors [34]. Whit the rapid wrought of wireless communications is necessary put focus in the future of NG wireless that will be based on pure IP-network, leading to a global interconnection and integration between heterogeneous wireless network as well as mobility protocols that provide seamless roaming and QoS requirements. To make multi-access solutions effective, we need an integrated solution providing seamless mobility between access technologies [36], allowing continuity and existing sessions, integrated authentication, integrated billing, terminal mobility, and service mobility.

The next Chapter describes a proposed architecture for management the roaming based on Brokered Model [14], [16] and [38] as well as SIP signaling protocol enhancement with Basic and Digest Access Authentication [8] and [46].

Chapter 5

MOBILITY MANAGEMENT PROPOSED

Loose coupling approach to the integration of WLAN and GPRS systems involves minimal interaction between the two networks. The only major requirement in this architecture is that both systems have access to a shared database of subscriber details that will be used for AAA functions. Advantages to this approach are: it allows the independent deployment and traffic engineering of 802.11 and 3G networks. GPRS can benefit from other providers' 8021.11 deployments without extensive capital investments. Also, roaming agreements with many partners can result in widespread coverage.

The theoretical model of mobile networks divides the system in different domains and levels [15]. Thus, IMS implements the control plane for IP multimedia services, while GPRS and WLAN provide the functions of transport plane. Logic map of multimedia IP services using SIP signaling are depicted in the Figure 5.1. Besides, it shows the functional elements of reference model *NG networks* (NGN) to GPRS-WLAN. When the MN moves to a WLAN, the traffic passes directly to the core IP networks (internet) through the access routers. The WLAN is effectively provided as an access network complementary to the cellular data network. This means that only the signaling traffic travels through the core GPRS network (HN) and not the traffic. The GGSN acts as an authenticator for MN into the WLAN (VN).

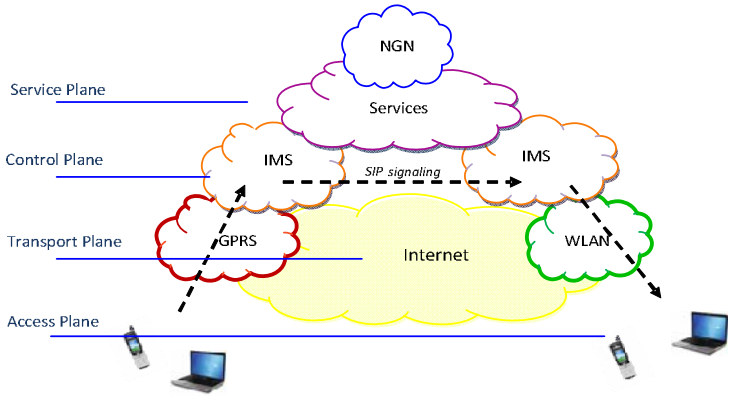

Figure 5.1 Functional elements based on NGN for GPRS-WLAN.

Concerning roaming management, several research works were earlier described in chapter four section four. These contributions includes service mobility management, nevertheless, approaches were not compared with other architecture under the same conditions, thus their effectively was not verified. For that reason, we pretend to compare the performance of NGN in two distinct models in a loose coupled architecture to enable roaming management and control session. This heterogeneous networks (formed by WLAN and GPRS technologies) follow the same principles, conditions and assumptions based on SIP.

SIP uses two basic network entities namely clients and servers. A client is an application program that sends SIP requests. A server is an application program that accepts and services SIP requests and sends back responses to the requests. The signaling passes via one or more servers while the media stream takes a direct path. The components used in our SIP signaling calls are given below:

- **User Agent:** User Agents are SIP network terminals like SIP phones and Gateways. UA contains application programs that send SIP requests and responses to initiate and receive calls over a SIP network. In our architecture are located into the mobile nodes.
- **Proxy Server:** A Proxy Server acts as the initial point of contact for all SIP requests. It acts as a server and a client for the purpose of making requests on behalf of other clients. Unlike User Agents, Proxy Servers do not initiate SIP requests on its own. A Proxy Server interprets and if necessary, rewrites a request message before forwarding it. Requests are serviced internally or by passing them to other servers.

The system for the analyzed models are illustrated in the Figure 5.2, where the ***resource management*** is comprised of heterogeneous network (channels and bandwidth allocation); the ***mobility engineering*** comprises integration heterogeneous access networks and services, providing mobility management based on SIP signaling; and the ***service management*** includes the provision of: mobile applications (as VoIP or videoconference), and mobile services (user profiles and AAA functions).

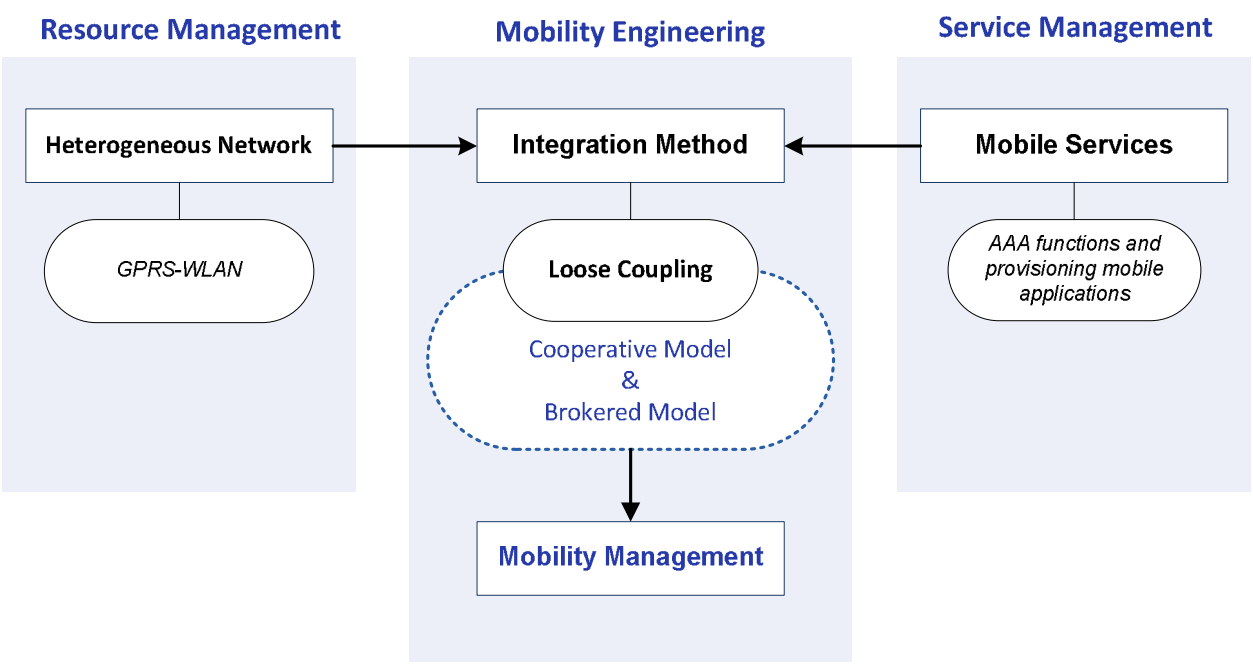

Figure 5.2 Diagram for mobility enginnering in the analyzed models.

This chapter is organized as follows: next section described both models used and their general specifications. Next, each model proposed is described, also its components and the necessaries requirements to provide management roaming and the form in that interworking the architectures.

5.1 ARCHITECTURE AND MODELS

This section introduces the design of two approaches to integrate communication in heterogeneous networks based on loose coupled architecture. The models are based on the classification for service composition of SAHARA project [39]: A) *Cooperative Model* and B) *Brokered Model*. The Figure 5.3 illustrates both models.

The first method is the *Cooperative Model* (CM) where both service providers have responsibility of providing guarantees (through SLAs) for the portion of the composed service within its domain.

The second method, the *Brokered Model* (BM) is where a broker is a central authority implemented to bring mobility management, which assumes responsibility for the properties of the composed service. Thus, the broker has SLAs with the GPRS service provider and with the WLANs services providers.

We define a SLA as a contract between the two entities in the architecture of one or more technical features, that indicates rules of supply conditions and that defines constraints of quality levels of such features i.e. overall capacity/throughput, reporting mechanism, authentication methods, etc. The SLAs can be composed of a business-legal part and a technical part however we only put focuses on the technical part.

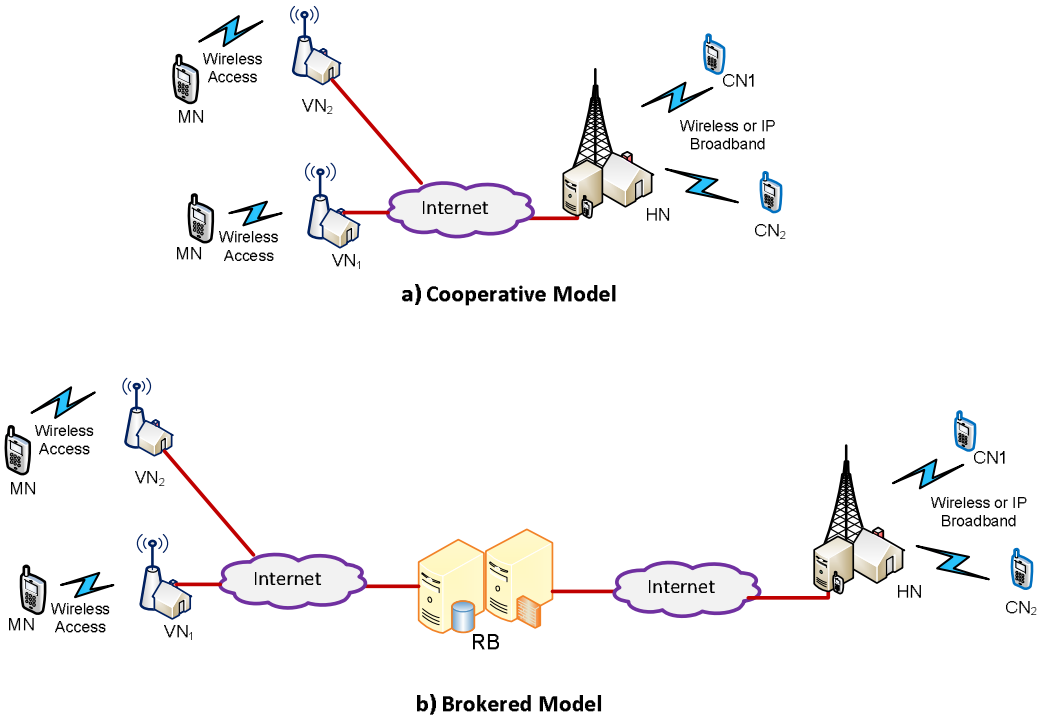

Figure 5.3 Classification for service composition of SAHARA project.

In either case, the end-user subscribes to only one provider (GPRS). However, the difference lies in the way the responsibility for the composed service is apportioned. The two possibilities represent different business models for composition. An important issue in service composition is to verify whether the provided service adheres to the desirable properties advertised by its provider. Such properties can be specified in a bilateral SLA between provider and requester. We use parameter verification and usage monitoring as mechanisms to ensure that the properties specified in the SLA are being honored. For instance, in our connectivity composition across domains, we have border routers monitoring control traffic from different providers to detect malicious route advertisements.

5.1.1 General Specifications for the analyzed models

The VN can provide *access control* for MNs under its domain, this is, the VN through *RADIUS server* (RADIUS/SIP). RADIUS/SIP contains an access control database that allows the MN

request authentication within the current coverage area of VN. Consequently, the VN can request MN's authentication to the HN or RB in its coverage area. To address issues such as management of wireless bandwidth VN implementing call admission policies, nevertheless they are out of scope of this thesis. In this context, is proposed the utilization of current call admission policies for unlicensed wireless network, for more details please refer to [17].

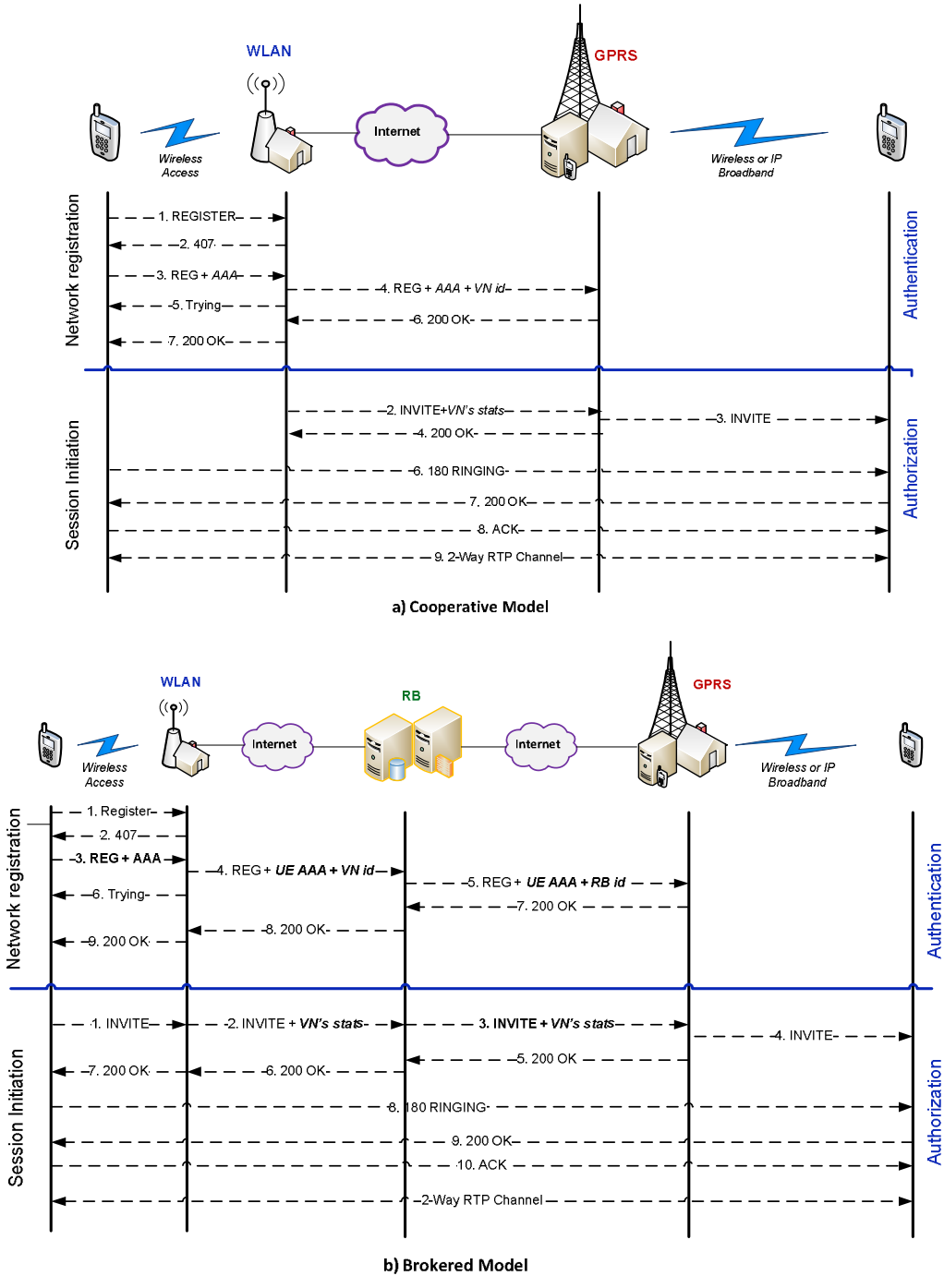

Figure 5.4 Signal diagram for authentication and authorization in both models.

For both methods, the procedure for network registration or authentication is very similar and is described above (see Figure 5.4). The session initiation (authorization) procedure is different in each model due the different elements that interworking for establish a multimedia session.

Requesting Authentication

The BS in the VN has assigned the task of review if can fulfill the QoS requirements based on its available resources, and then, the VN replies with a Proxy Authentication or not. If the requirements can be fulfill then initiate the procedure for network registration. The VN request to the MN its credentials (based on RADIUS server) and roam in its coverage area.

Mobile Node (MN) login initiate a network registration using a SIP_407 message and can occur in two forms of access control:

1) When the MN enters into the VN coverage area the BS (in the VN) detected it and acts as an SIP gateway request to the MN its credentials by mean a 407 message.
2) The other relates to the MN roaming into the VN and intent register through a SIP REGISTER message, this message includes a Content-type in the Session Description Protocol (SDP) section of the SIP message, specifying the minimum QoS requirements for the application. The MN access control is triggered once the MN enters into the VN coverage area. In it instant, the AP in the VN acts as SIP gateways that request to the MN its credentials by means a message of Error 407 asking to the MN to provide its credentials (username and password).

Otherwise the VN transmits an error message indicating that the QoS cannot be guaranteed. The details for authentication (network registration) in the models are described in sections 5.2.1 and 5.3.1.

Requesting Authorization

The authorization for VN is controlled by RADIUS server in collaboration with the LDAP reputation list. The HN in CM or RB in BM assigns credentials (VN id and password) to each VN (which have SLAs whit it); the VN stored this information in RADIUS server. Then VN send it credentials with SLA statistics to the HN or RB in a new message, the SIP_INVITE/AAA message.

SLAs statistics referred to the available resources in the VN. HN verifies the current networks statistics through a monitoring enforcement. Furthermore the HN (in CM) or RB in (CM) has a ***reputation list management with LDAP*,** where assign labels with the last behavior of the VN. If

the last time the service provided to MN does not fulfill the minimum QoS agreed in SLAs and is the first time, a label is set brown, if it was the second time then has a black label. Otherwise, if the last time met the SLAs it has a white label. If is the first time and can fulfillment the SLAs has a white label too. If the label is black the HN do not authorize the VN to bring service to the MN. But if the label is brown or white, then the VN is authenticated and the MN will be authorized too to initiate session in the VN's coverage area through IMS with other node.

The ***visited network statistics*** are evaluated if the SLAs are met, the VN has a label brown or white. If the answer is yes in both, then the HN authorized sending to a 200 OK message, it means that network access is granted, else the network access is denied through a 404 message. If the MN had granted network access then can initiate its network operations.

5.2 ARCHITECTURE BASED ON COOPERATIVE MODEL

The cooperative method define the first model for our simulation where the properties of the composed service such as functionality, performance, and availability, are guaranteed by the design of the distributed interaction, and through SLAs between the interacting entities (GPRS-WLAN). Each service provider is only responsible for providing guarantees for the portion of the composed service within its domain. Therefore the entities that establish link between two networks could present traffic congestion because are realizing activities extras to which originally were designed. The goal is to minimize the modifications in GPRS and WLAN networks based on Cooperative Model for roaming between the two networks, where the GPRS is the HN and WLAN the VN. The VN through Internet connects directly with the HN. The AAA server controlled by RADIUS in the VN is the credentials sender, is subsequently referred to as a RADIUS/SIP element. But neither the VN can authenticates or authorize to the MN initiate session in its coverage area, these privileges is reserved to the HN. Therefore the roaming decision maker is the HN.

Before authentication the HN assigns credentials (MN id and password) to each MN under its domain, and equally assigns credentials (VN id and password) to each VN in the network.

The settlements between HN and VNs (SLAs) ought to contain clear details on the characteristics of service supplying. The GPRS service provider with a WLAN service provider make SLAs agreements where specifies clearly state on conditions to collaborate in the authentication, authorization and accounting process to verify the integrity of elements of the architecture. We only put focus on the technical characteristics.

After the subscription of the VN in the HN's domain and based on its technical capabilities i.e. internet bandwidth, wireless bandwidth, etc. the HN creates a SLA for every VN. In order a SLA to become effective, the agreed constraints have to be placed in the real network, thus the SLAs in our architecture are placed in the form *of SLA enforcement policies* on the wireless access points in the VNs. This is HN has SLAs with VNs. Currently, there are some techniques to obtain network statistics i.e. *Simple Network Management Protocol* (SNMP), ping, and HTTP requests. The VN's SLA monitor relies on these techniques to determine and to calculate the network statistics. When the VN's SLA monitor receives these, in cooperation with the HN's *SLA enforcer* creates or updates the reputation list.

5.2.1 Roaming SIP signaling procedure

The elements to management roaming using SIP in this architecture can be classified in two blocks, the Figure 5.5 shows a diagram with these blocks, one for the VN (blue) and second for the HN(red), where each kind of technology has assigned a proxy SIP agent.

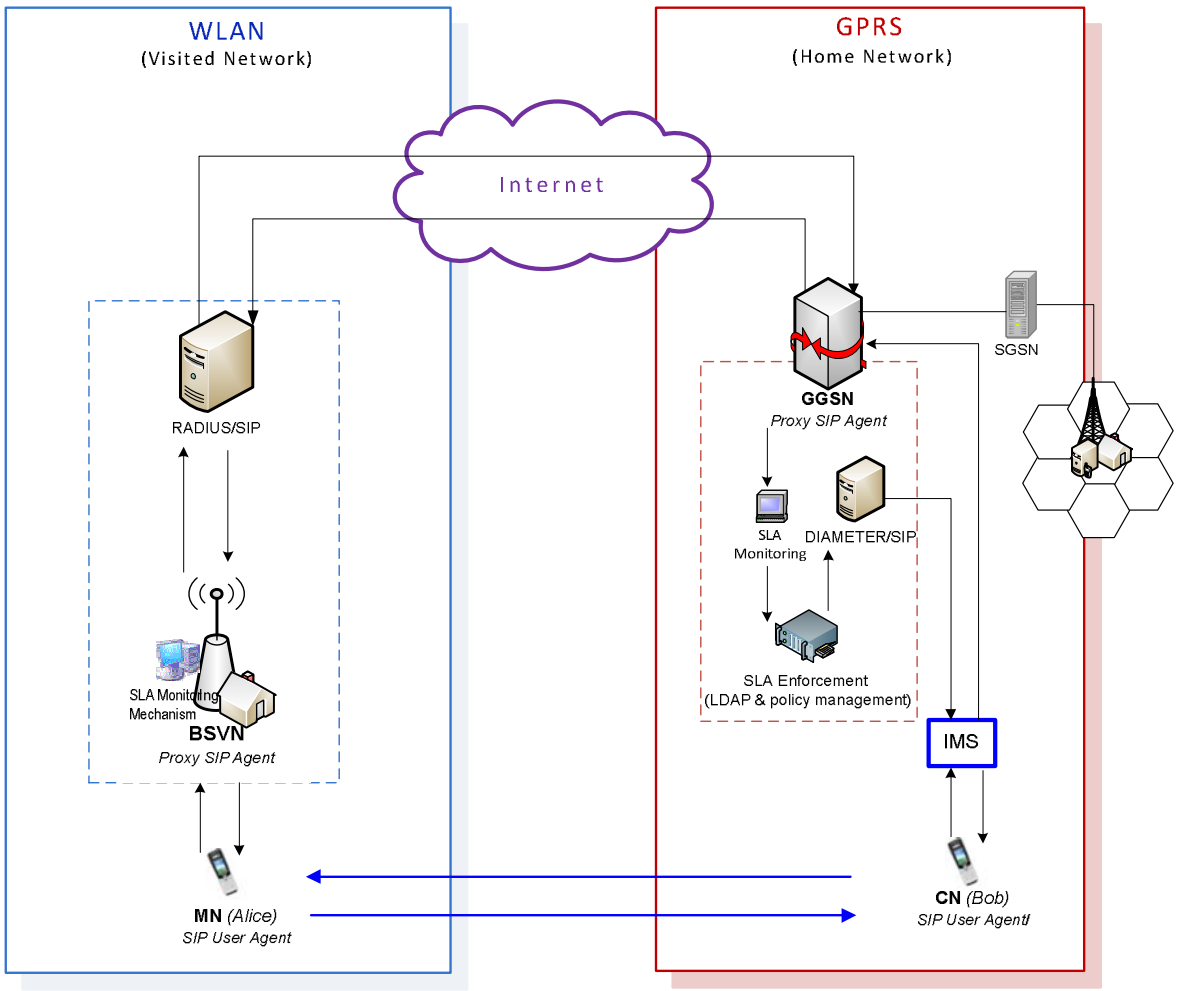

Figure 5.5 Elements for Cooperative Model.

RADIUS/SIP element (RADIUS server) was added in VN and *DIAMETER/SIP element* was added to the HN to offer support legacy SIP-based technologies. Based on SLAs, previously the HN had assigned credentials (VN id and password) to each VN. Thereby, the VN due the contractual agreements with HN is able to forward the SIP_REGISTER/AAA and SIP_INVITE/AAA messages to the HN. The DIAMETER/SIP element in the HN translates the SIP_REGISTER/AAA message into DIAMETER to enable communication with the IMS. Once the user is authenticated and authorized by the HN, it informs the VN to accept the visitor.

SLA enforcement relies on a *SLA policy manager, a SLA enforcement policy, a LDAP based reputation list, an SLA monitor in the HN and a VN monitoring mechanism* (see Figure 5.5). The SLA policies are created by the HN from measurable parameters such as network capacity or throughput, network delay, number of simultaneous VoIP calls, etc.; and managed and applied in the VN through the SLA policy manager. The policies define a set of rules placed on the access point that make it behave as specified in the SLA. In addition, the LDAP based reputation list is created with information provided by the SLA monitor in each VN. Figure 5.6 depicts the signaling procedure for network registration and session initiation in CM.

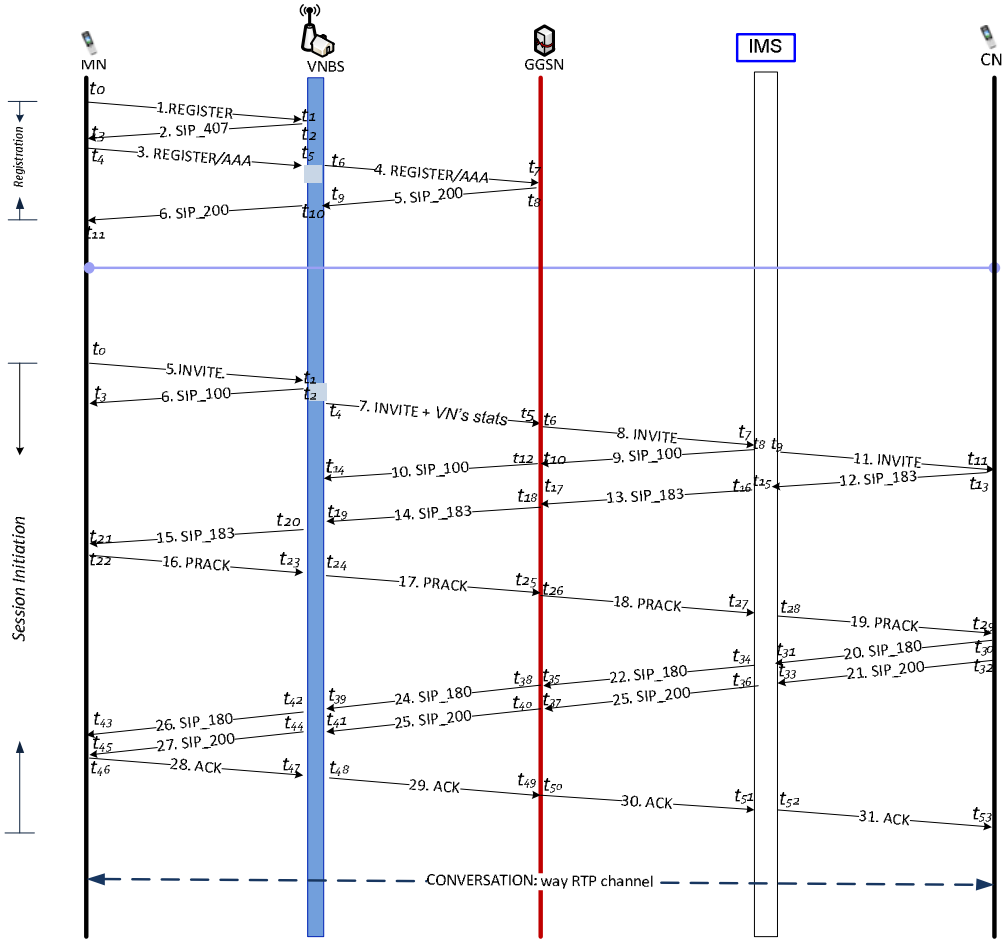

Figure 5.6 SIP signaling based on roaming Cooperative Model.

Network Registration

Upon the reception of a 407 message, the MN re-transmits the registration message however this time with its credentials. Then the VN includes its credentials into the SIP-REGISTER/AAA packet and forwards the REGISTER/AAA + VN id message to the HN.

Upon the reception of a registration message from a VN, the HN extracts the VN identifier and the SLA-related information to perform a look up in the reputation list. If the VN has an acceptable SLA reputation and the network statistics fulfill the SLA requirements, the VN credentials are confirmed and the MN is authenticated and approved to roam in to the VN. The HN informs through a 200 message that network registration has been successfully accomplished. If there is an error concerning the MN credentials the VN responds with a 401 unauthorized message. If for any reason the MN receives a 401 message it will not be able to roam into the VN.

Session Initiation

A MN that was registered successfully can request communication with other node (located in anywhere and enabled with SIP User Agents) through a session initiation procedure or authorization. Where it must to be authorized by HN. This is based on verification of the SLAs.

Session initiation signaling starts with the SIP_INVITE message once a MN attempts to establish a multimedia session i.e. VoIP call from a VN. Likewise the network registration process, the application specifies within the SIP_INVITE message in the *Session Description Protocol* (SDP), the minimum QoS requirements in VN, in order to establish the session.

After verified the SLA requirements, the VN attaches into the SIP_INVITE message current network statistics and forwards it to the HN. When the HN receives a SIP_INVITE message from a VN, processes the message and the monitoring enforcement creates or update the LDAP reputation list for reviewed if has an acceptable label, then verified the VN's credentials. Winning authorization, the HN deliver the SIP_INVITE message to the other peer at same time send the 200_OK message to the VN. This can be performed through the cellular network or through a broadband IP network. Once the other peer responds to the invitation, both peers are able to start the multimedia session.

Contributions

The signaling into Cooperative Model from and to the HN is performed through SIP signaling, in this respect, we propose extensions for network registration into SIP_REGISTER/AAA [7], [16]

and for session initiation into SIP_INVITE extensions to enable management roaming and SLA information exchange. Moreover *the seek* in the LDAP reputation list.

Our contribution for the SIP_REGISTER and SIP_INVITE messages were implemented essentially in the *sip-message.cc* and *sip-message.h* files, where we added a method for authentication and authorization based on [8] which detail a basic and digest access authentication.

5.3 ARCHITECTURE BASED ON BROKERED MODEL

In the Brokered Model [39], the broker is the *roaming broker* (RB), which assumes responsibility for the properties of the composed service. Then the broker ought to be SLAs with the GPRS service provider and by other side with the WLANs services providers. The broker verifies the functionality of the individual pieces in the service path. Therefore the roaming broker not added heavy traffic load on the devices of individual networks. This model followed the vision of thirdly party and defines the second scenario for our simulation.

After the subscription of the VN in the RB's domain and based on its technical capabilities i.e. internet bandwidth, wireless bandwidth, etc. the RB creates a SLA for every VN. In order a SLA to become effective, the agreed constraints have to be placed in the real network, thus the SLAs in our architecture are placed in the form of ***SLA enforcement policies*** on the wireless access points in the VNs. In addition, the RB establishing mutual trust with the HN through contractual agreements. See incise b) of Figure 5.3 where is illustrated the model of this architecture. Currently, there are some techniques to obtain network statistics i.e. *Simple Network Management Protocol* (SNMP), ping, and HTTP requests. The VN's SLA monitor relies on these techniques to determine and calculate the network statistics. When the VN's SLA monitor receives these, in cooperation with the RB's ***SLA enforcer*** creates or updates the *reputation list.*

The RB provides access control for VN's under its domain. The signaling from and to the RB is performed through enhancement SIP signaling. The model of the architecture involves that the RB is in charge of coordinate the authentication, authorization and accounting process, verifying the integrity of the architecture's elements. The settlements between the RB and the VNs (mutual trust) ought to contain clear details on the characteristics of service supplying. If the VNs can fulfill the conditions established on real network and time, then should provide the service to the user. The RB and the HN through a contractual agreement established settlements for aggregate to VNs that supply services to the user.

5.3.1 Signaling procedure

To understand the interworking between the elements to management roaming based on SIP in Brokered Model the Figure 5.7 illustrated a block diagram where the principals components in the architecture proposed can be classified in three blocks. Each one which are: the VN (blue), the RB (green) and the HN (red), where each network has assigned proxy SIP agents. The RB has assigned a SIPRB agent which is a *contribution* that we proposed to SIP (see Appendix B).

A gateway interworking between GPRS and WLAN [4], [10] and [15] here is considered the RB. The goal of it is to minimize the modifications in GPRS and WLAN, with RB users can seamlessly roam among the two systems, where GPRS is a user´s HN. As referred in [16] RB acts an authorized proxy to establish SIP dialogs with the HN on behalf the VN's.

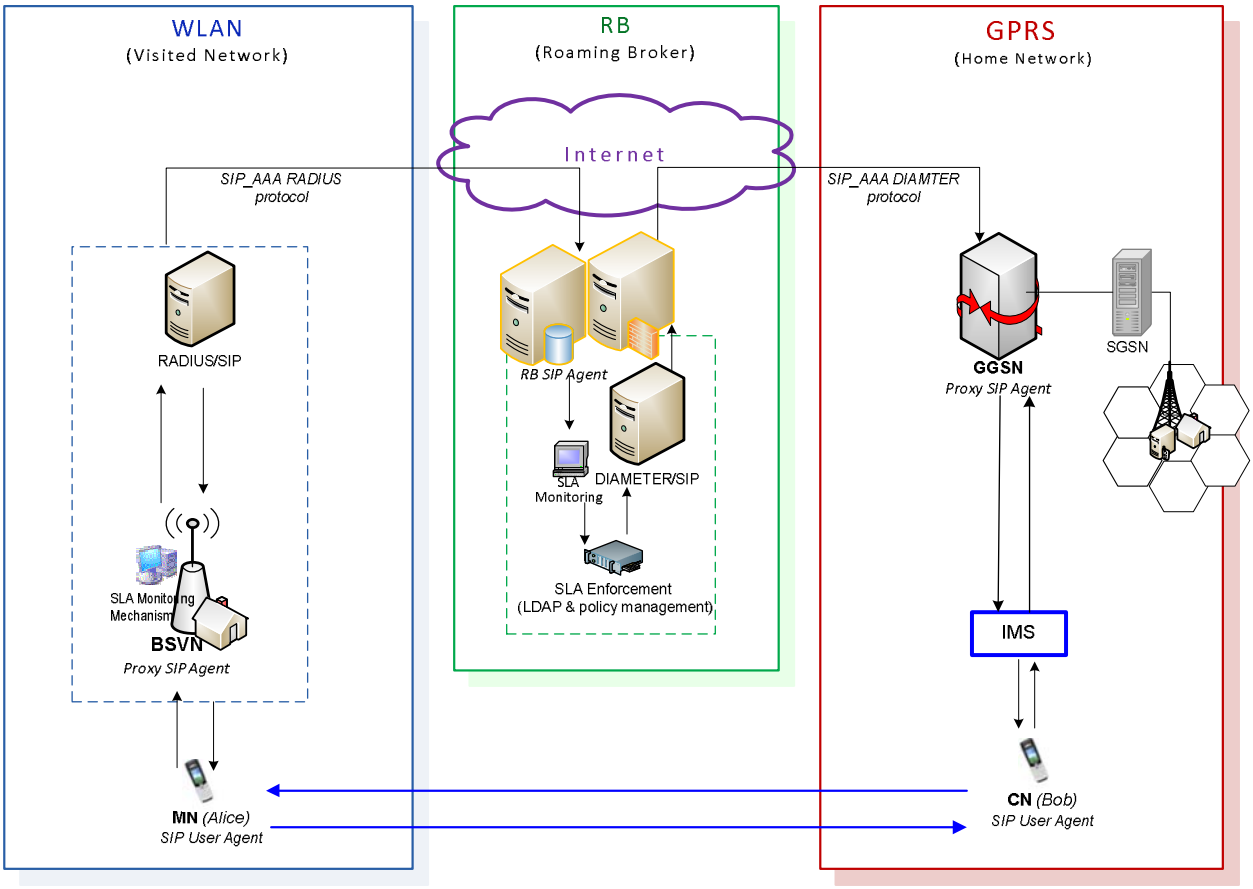

Figure 5.7 Elements for Brokered Model.

SLA enforcement relies on a *SLA policy manager, a SLA enforcement policy, a LDAP based reputation list, an SLA monitor in the RB and a VN monitoring mechanism* (see Figure 5.5). The SLA policies are created by the HN from measurable parameters such as network capacity or

throughput, network delay, number of simultaneous VoIP calls, etc.; and managed and applied in the VN through *the* SLA policy manager. The policies define a set of rules placed on the access point that make it behave as specified in the SLA. In addition, the LDAP based *reputation list* is created with information provided by the SLA monitor in each VN.

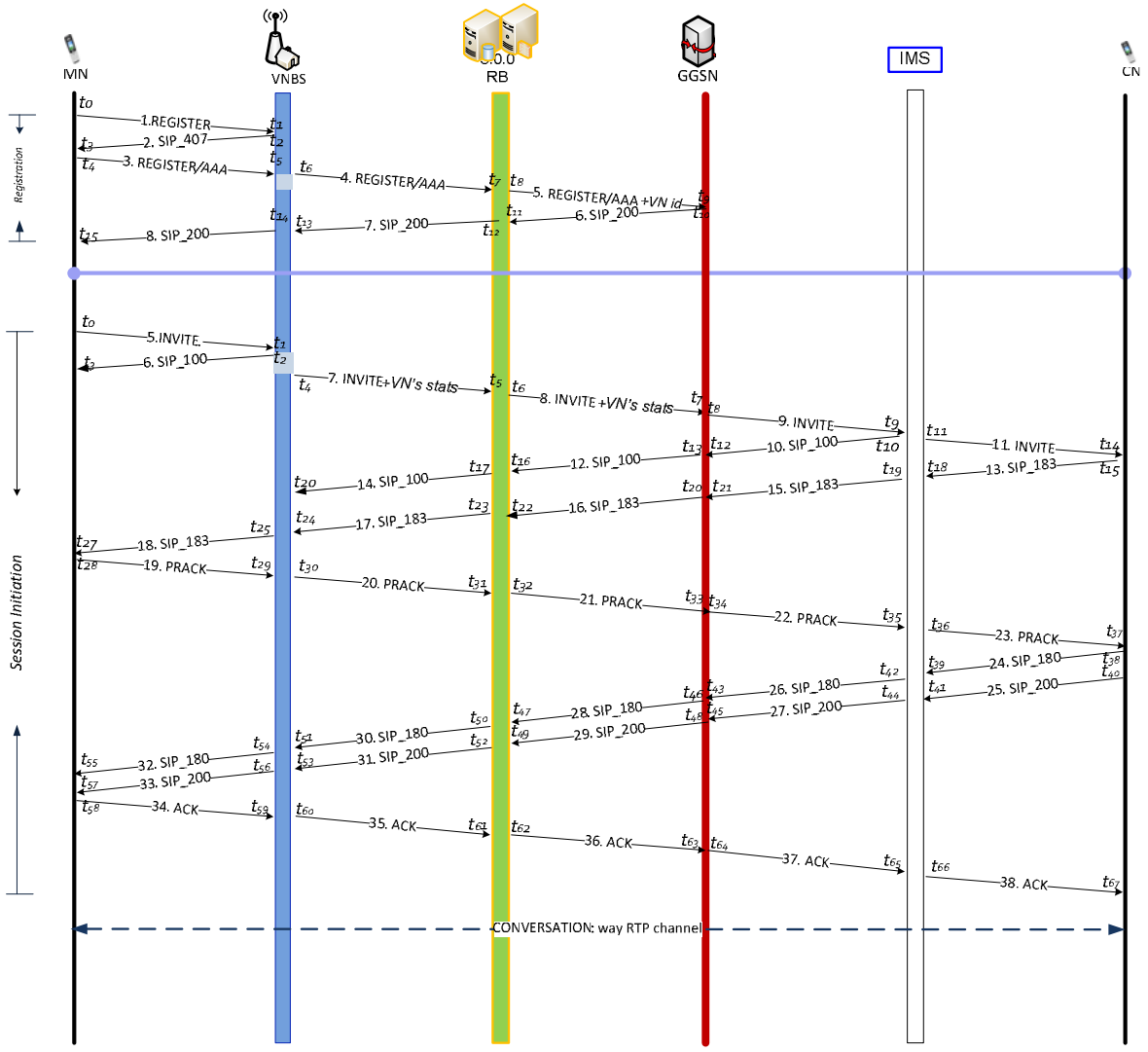

Figure 5.8 SIP_AAA signaling based on roaming Brokered Model.

RADIUS/SIP element in the RB contains an access control database (RADIUS) allows the RB to authenticate and authorize VNs to offer roaming services. For authentication, the RB assign the credentials (VN id and password) to each VN in the network, this information is stored in the RADIUS server. When a MN roams into a WLAN covered area, MN access control is triggered and the AP in the VN acts as an SIP gateway that sends the MN SIP request to the RB. The RB due to the contractual agreements with the HN is able to forward the SIP-REGISTER message to the HSS-HLR/AuC in the HN. The DIAMETER/SIP element in the RB translates the SIP-

REGISTER/AAA message into DIAMETER to enable communication with the IMS. We added RADIUS/SIP and DIAMETER/SIP elements in the RB because we consider important to offer support to legacy SIP-based technologies. The Figure 5.8 showed the signaling for Brokered Model.

Network registration

In Brokered Model for authentication the RB assign credentials (VN id and password) to each VN in the network, this information is stored in the RADIUS server. The authentication is as in CM is controlled by the RADIUS server in collaboration with the LDAP reputation list. The procedure for look up in the LDAP reputation list is the same that the Cooperative Model only that the reputation list is on the RB. This list previously was update from RB to the VN. In this perspective, in addition to VN's identification the RB, the HN must verify whether or not the VN has acceptable reputation to offer roaming services.

Upon the reception of a 407 message, the MN re-transmits the registration message however this time with its credentials. Then the VN includes its credentials into the SIP-REGISTER/AAA packet and forwards the REGISTER/AAA + VN id message to the RB. After the reception of a registration message from a VN, the RB extracts the VN identifier and the SLA-related information to perform a look up in the reputation list. If the VN has an acceptable SLA reputation and the network statistics fulfill the SLA requirements, then the RB is ready to forward the SIP_REGISTER message to the HN for network registration otherwise it is discarded. Before of transmit the message, the RB translates the SIP message into DIAMETER and includes the RB identifier and password assigned previously (SIP_REGISTER/AAA + RB id) to the HN.

Once that the RB credentials are confirmed and the MN is authenticated and authorized by SIP Proxy Agent located in the HN, the HN informs through a 200 message that network registration has been successfully accomplished. If there is an error concerning the MN credentials the VN responds with a 401 unauthorized message. If for any reason the MN receives a 401 message it will not be able to roam into the VN.

Initiation of Session

A MN that was registered successfully can request communication with other node (located in anywhere and enabled with SIP User Agents) through a session initiation procedure or authorization. Where must to be authorized by HN. This based on verification of the SLAs.

Session initiation signaling starts with the SIP_INVITE message once a MN attempts to establish a multimedia session i.e. VoIP call from a VN. Likewise the network registration process, the application specifies within the SIP_INVITE message in the SDP, the minimum QoS requirements in order to establish the session.

Once verified the SLA requirements, the VN attaches into the SIP_INVITE message its credentials and the current network statistics from the VN's SLA monitor and forwards it as probes to the RB. When the RB receives a SIP_INVITE message, it processes the message, the RB's SLA monitor receives the statistics, reviewed it and in cooperation with the RB's SLA enforcer creates or updates the reputation list. Subsequently, verified if the VN's credentials are correct.

If the VN fulfill all the requirements the RB redirects the SIP_INVITE message to the HN which is the entity that will deliver, upon authorization, the message to the other peer. This can be performed through the cellular network or through a broadband IP network. Once the other peer responds to the invitation, both peers are able to start the multimedia session.

Contributions

The signaling into Brokered Model from and to the HN is performed through SIP signaling, in this respect, we propose extensions for network registration into SIP_REGISTER/AAA [7], [16], and for session initiation into SIP_INVITE extensions to enable broker based management roaming. The contribution to SIP initiates with the addition of VN credentials and current network statistics (SLA related information) upon the reception of the SIP_REGISTER packet from the MN. Also, we contributed upon the reception of the SIP_INVITE message, the VN based on its current capacity and the SLAs policies determines (in collaboration with the LDAP reputation list) whether or not can meet the SLA specified by the RB.

Our contributions (additions) for the original SIP Module for NS2 were made in SIP_REGISTER and SIP_INVITE messages, implemented essentially in the *sip-message.cc* and *sip-message.h* files, where we added a method for authentication and authorization based on [8] which detail a basic and digest access authentication. Therefore for the correct functionality of Brokered Model and the addition of third party, was necessary to add *sip-RB.h* and *sip-RB.cc* files for the assembly of *SIP RB Agent* in SIP Module original.

The general structure of the administration of roaming based on SIP signaling for the comparison of the models described was detailed in this chapter. For each model, the

parameters and settings used in our simulations are described in the next Chapter and the simulation results.

Chapter 6

SIMULATIONS AND RESULTS

This chapter presents the models and simulation results for each architecture designed in the previous chapter. Our work analyzes the behavior of the two models for roaming between heterogeneous networks (GPRS to WLAN). The organization of this chapter is as follows, first it is described the environment used in the realization of our simulations and the parameters used are specified in different tables. In the second section we analyze the network registration procedure (authentication); furthermore the results comparison between both are described. The last section shows the results obtained in both models for session initiation (authorization) and the correspondent comparison.

6.1 ENVIRONMENT FOR BOTH MODELS

At the dawning of the 21st century, wireless local area network support different types of traffic such as VoIP however in a closer future it will be common to see several mobile users attempting to roam into unlicensed wireless networks. The access point in the VN is the element with lower computing capacity in our architecture, hence we decided to evaluate the impact of VoIP traffic on the VNs. We select the delay as performance measure because is a parameter that directly affects the quality of voice.

We discomposed the delay in the VN into average wireless SIP signal delay and average processing delay. For our analysis, is important clarify the next concepts:

- **Delay** is the time taken since a data leaves its source and the instant in that reach its destination (receptor). Ignoring queuing delay at the source.
- **Wireless SIP signal delay** is the length of time that a MN takes to put a message on the VN (WLAN). Is determined by the speed of the media and the size of the packet.
- **Processing delay** consists of steps such as looking up a route and changing a header. When a packet comes in, the networking device (bridge, router, or switch) needs to decide which interface it should be sent out on. In some cases, the packet also needs

to be manipulated (by changing the data link layer encapsulation, changing the hop count, etc.). For the case of destination machines this delay is even more significant.

- **Overall delay** we consider like as the time difference since the MN initiates the network registration, or session initiation process, and the reception of the 200 OK message indicating the success of the process.

6.1.1 Reaches

Cooperative Model and Brokered Model for enabling access control have been designed under the same assumptions, technical characteristics and the scenarios of probes proposed are the same (except for the added of node called broker in the Brokered Model).

The *Network Simulator* (NS2) [51] version 2.33 was selected for realized our simulations, which have implicit the module 802.11 network like as based for mobility scenarios. We are managing two distinct wireless technologies (802.11 and GPRS) which can be controlled by signaling SIP like as fundamental part of IMS based on the IETF RFC 3261 [6]. To design the simulation model was used SIP Module by Rui Prior [52] which we adapted for NS 2.33. For details about installation process of NS2 and Module SIP addition please review the Appendix A.

Furthermore, to the Module SIP for NS2 we added the objective to use credentials within the SIP REGISTER message after a 407 message request within a procedure based on the IETF RFC 3702 [7]. Following the guidelines for extensions of SIP shown in IETF RFC 4435 [9], for loose coupled integration in the IETF RFC 4083 [23] was found the release 5 for requirements of SIP in the 3GGP. We have two kind of nodes for SIP User Agents wired (named called) and wireless (named caller). SIP Proxy Agents are used in the devices that link both networks. For Brokered Model was added to the SIP Module other agent server namely “SIPRB” which reside in server intermediate that link both networks. For detailed information about please see Appendix B. The design of SIP roaming broker agent was based on the code for proxy SIP agent [52] and the theoretical of [4], [9], [14] and [16].

Security based on IETF RFC 2617 [8] was added to the SIP Module. We built two kinds of compilations for NS2, one for each model because we needed to make different modifications to the original SIP Module [52] in each one model. For each model we have one simulation environment based on modifications different into SIP Module of NS2 environment. All that is be implemented refers only to the SIP signaling and its correspondents changes for authentication header and authorization header in the both architectures modeled. For

example, the addition of broker entity in brokered model we generated different functions for authentication and authorization.

The purpose of this thesis is found the best model in a loose coupled integration the Brokered and Cooperative models in terms of delay produced by SIP signaling using agents.

6.1.2 Delimitations

In order to perform handovers and guarantee authorized user access there are a basic requirements that must be in place for both. We delimited our computational simulation based on underlying assumptions for compare both models. In the context of the presence of multiple services providers (independent network operators) we classified our assumptions in network related and technical.

Network related assumptions

i. *Home Network* (HN) is always in the GPRS network.
ii. *Visited Networks* (VNs) are in the WLAN networks.
iii. In *Cooperative Model* mutual trust between the HN and VN is legitimated by SLAs that has clearly state on the conditions of service supplying.
iv. In *Brokered Model* the HN and RB mutual trust is endorsed by contractual agreements. Through these agreements the broker assumes responsibility of the VNs under its domain. Consequently, the RB also responsible of verifying the functionality and the performance of the VNs. nts with RB, by other side, the RB and VNs has SLAs.
v. *The introduction of SLAs in ours simulations only set focus in the technical part*, the legal of these agreements is out of our research because we consider that is not fundamental in our study area, but can be founded details in *"Roaming considerations for finish public WLAN market"* by Smura Timo [14]. The SLAs in both models, represent a low cost and fast time-to-market.
    a. *SLA enforcement* (described in the previous chapter) is located in the HN or RB.
    b. *SLA monitoring* is located in the VN.

Technical assumptions

Due that the differences between the GPRS network operator and *Wireless ISP* (WISP), it is necessary to follow the next rules:

i. The MNs in the VN always is the caller.
ii. The *mobile equipment* must be a dual mode terminal set up for mobile radio communication and wireless networking (GPRS and IEEE 802.11b card) and the ability to perform vertical roaming /handover. A *SIP UA resides into the network terminals* (caller and called).
iii. The architectures are based on traditional loose coupled integration and IP mobility. HN and VN are interconnected through the Internet (IP broadband network).
iv. *SIP protocol* [23], [42] and [46] *enhancement with* AAA [31] in follow referred as SIP_AAA is the signaling protocol for management roaming in both approaches.
v. A *SIP Proxy Server Agent resides in each one network* (WLAN and GPRS).
vi. The *SLA monitoring into VN* provides detailed information with hour and date about the processing delay of router (network statistics); through the INVITE message (after SIP header, in SDP body), details are showed in [16].
vii. The methodology and criteria for selection of a VN that follows the HN in CM or RB in BM is based on the monitoring of statistical sampling of the VN (which includes detailed information about processing router delay in the router of WLAN with date and hour).
viii. The characteristics of service supplying and conditions to collaborate are in the SLAs. The minimum requirements to be fulfilled the WLAN (802.22b) are:
    a. Delay of 150ms (value recommended in [38] for successfully transmission of voice traffic).
    b. Support GSM codec (13.3kbps [13]).
    c. WLAN bandwidth of 2Mbps.
ix. *HN is the roaming decision maker* independently of the model. Consequently HN authenticates and authorize to the VN to offer roaming services. In our architecture, authentication signaling is related to the network registration and authorization signaling to session initiation process.
x. In BM, the roaming broker bougth the capacity from the networks operators (WLAN) and resell capacity to service operators (GPRS).

6.1.3 Parameters

We have two simulation environments, accord with the models studied, the common simulation parameters in our heterogeneous models are listed in Table 6.1.

Table 6.1 Basic parameters and values.

PARAMETERS	VALUES
ΔHN	10 ms
Δi	150 ms
VN Internet bandwidth	2 Mbps
RB Internet bandwidth*	20 Mbps*
GGSN-IMS bandwidth	100 Mbps
Max. SIP Pkt. Size	587 bytes
Wireless MAC Layer	802.11b
VoIP codec	GSM - 13.3 kbps
Speed of each MN move to WLAN	{1, 10, 20} m/s
Number of VoIP sources variable	{1, 5, 10, 15}
* *Only for Brokered Model*	

Details of the parameters and values used in the elements that interworking in our scenarios (GGSN, IMS, CNs, VNBS MNs and RB for CM) can be founded in the Tcl code showed for both models in Appendix C.

Ours simulation environments comprise different types of nodes and are listed in the Table 6.2. The node for the HN includes the GGSN, the IMS and the access control server.

Table 6.2 Types of nodes in models.

COOPERATIVE AND BROKERED MODELS	
MN	*User Equipment*
VN	*Visited Network (WLAN)*
HN	*Home Network (GPRS)*
RB*	*Roaming Broker*
**Only for Brokered Model*	

We define twenty scenarios which were probed for each one simulation model. Where we evaluated the impact of different VoIP traffic load conditions on the VN. Each scenario is based in the number of wireless nodes {1, 5, 10, 15} that request authorization and authentication and in the speed of these nodes in meters over seconds { 1m/s, 3m/s, 6m/s, 10m/s, 20m/s}.

Each MN arrive every 5 seconds. Under each scenario, by each two MNs that arrive, only one MN performs the network registration and session initiation process. We set the maximum number MN that arrive to VN is 30, which represent that only 15 will be VoIP sources into VN

because in [20] was demonstrated that 802.11b hardly support more than 15 simultaneous VoIP calls.

The results presented above in this chapter are the average of 20 independent replications simulation in every one scenario. The independence of replication was accomplished using different random number seeds for each simulation. So that we realized a total of 800 independents replications simulation, therefore for each scenario we have 400 replications.

In terms of approximately to the real world, we stablish that the calls arrivals follow a Poisson distribution. We considering in all scenarios the same time distribution for registering and initiate session in both models.

Table 6.3 Times of MNs and Call arrivals with Poisson distribution.

MN	ENTERING IN VN	REGISTER (SEC)	CALLS ARIVALS	BYE TIME
1	5	15	*Between 15-25*	*Between 60-70*
5	9	55	*Between 55-65*	*Between 100- 110*
	19	65	*Between 65-75*	*Between 110-120*
	29	75	*Between 75-85*	*Between 120-130*
	39	85	*Between 85-95*	*Between 130-140*
	49	95	*Between 95-105*	*Between 140-150*
10	14	105	*Between 105-115*	*Between 150-160*
	24	115	*Between 115-125*	*Between 160-170*
	34	125	*Between 125-135*	*Between 170-180*
	44	135	*Between 135-145*	*Between 180-190*
	54	145	*Between 145-155*	*Between 190-200*
	64	155	*Between 155-165*	*Between 200- 210*
	74	165	*Between 165-175*	*Between 210-220*
	84	175	*Between 175-185*	*Between 220-230*
	94	185	*Between 185-195*	*Between 230-240*
	104	195	*Between 195-205*	*Between 240-250*
15	29	155	*Between 155-165*	*Between 200- 210*
	39	165	*Between 165-175*	*Between 210-220*
	49	175	*Between 175-185*	*Between 220-230*
	59	185	*Between 185-195*	*Between 230-240*
	69	195	*Between 195-205*	*Between 240-250*
	79	205	*Between 205-215*	*Between 250-260*
	89	215	*Between 215-225*	*Between 260-270*
	99	225	*Between 225-235*	*Between 270-280*
	109	235	*Between 235-245*	*Between 280-290*
	119	245	*Between 245-255*	*Between 290-300*
	129	255	*Between 255-265*	*Between 300- 310*
	139	265	*Between 265-275*	*Between 310-320*
	149	275	*Between 275-285*	*Between 320-330*
	159	285	*Between 285-295*	*Between 330-340*
	169	295	*Between 295-305*	*Between 340-350*

Table 6.3 describes the time distribution of the activities that each MN performs when enter into VN's coverage area; in this table only are record the MNs that perform network registration and session initiation; the fourth column shows the distribution of calls arrivals, which was order only with object of study. We consider that call time of MN has a duration of 45 seconds. Therefore, the BYE time is the addition of time session initiation and 45 seconds.

In the scenarios with 1 MN, the MN_0 request authentification at second 15 and try to stablish session initiation between the seconds 15 and 25. Please, observe that in the second 20 the MN_1 too enter into the coverage area of VN but will not be authenticated.

The scenarios with 5 MNs show that after second 95 the MN_8 can have an active conversation (way RTP channel), at same time the MN_6, MN_4 and MN_2 have conversations, and before second 100 the MN0 too has other active conversation. Therefore, in these scenarios, we have in average 4.5 MNs with active conversations by maximum 5 seconds; and 4, 3, 2 and 1 active conversations by 10 seconds each one.

Furthermore the scenarios with 10 MNs after second 145 the MN_8 can have an active conversation (way RTP channel), at same time the MN_6, MN_4 and MN_2 have active conversations, and before second 150 the MN_0 too has other active conversation. Therefore, in these scenarios, we have to 6 online conversations by maximum 5 seconds. After occurs similar situation with the other nodes to after second 195 where the MN_{18} can have an active conversation, at same time the MN_{16}, MN_{14}, MN_{12} have conversations, and before second 200 the MN_{10} too has other active conversation. This is, *by maximum 55 seconds we have in average 5.5 active conversations different of 5.5 diverse MN in the VN*. Since M_0 enter into VN, we have for the first 40 seconds, periods of 10 seconds for 1, 2, 3 and 4 active conversations. After second 210 are have periods of 10 seconds for 4, 3, 2 and 1 active conversations. Therefore we have 20 seconds with 4, 3, 2 and 1 active conversations.

In the scenarios with 15 MNs, we can *have in average 5.5 different MN that have in average 5.5 active conversations different in average into the VN by maximum 105 seconds.* Since M_0 enter into VN, we have for the first 40 seconds, periods of 10 seconds for 1, 2, 3 and 4 active conversations. After second 310 are have periods of 10 seconds for 4 active conversations, after second 320 periods of 10 seconds for 3, following 2 and finally 1 active conversation after the second 340. That is, we have 20 seconds with 4, 3, 2 and 1 active conversations.

Table 6.4 Seed number used in each one simulation for all scenarios.

SIMULATION N°	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Seed Number	*22*	*33*	*44*	*55*	*66*	*77*	*88*	*99*	*110*	*121*	*132*	*143*	*154*	*165*	*176*	*186*	*198*	*209*	*220*	*231*

In the Table 6.4 we presented the values used as random seed for the MN's position when it enter in the VN's coverage area; was selected taken in account the coverage radius of the *Visited Network Base Station* (VNBS) that is 250 meters. The distribution used for the initial position of the MN follow a Uniform distribution (between 250 and -250) relative to the VNBS position.

6.2 NETWORK REGISTRATION IN MODELS DISCUSSED

6.2.1 Coperative Model

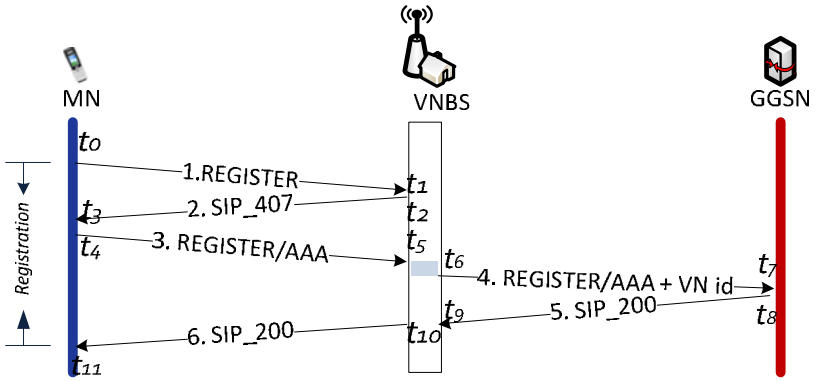

Figure 6.1 Sigaling flow diagram for network registration in CM.

The signaling flow (and time) performed in the procedure of network registration for CM is showing in the Figure 6.1. We consider the *overall processing delay* for network registration like as the difference between t_0 and t_{11}. W*ireless SIP signal delay* is the length of time that a MN takes to put a message on the VN (WLAN) so that we take the average time value of (t_0 and t_1) and (t_4 and t_5). The *wireless processing delay* was taken of the time that spend the VNBS in process a message and emit a response (difference between t_6 and t_5).

The description for each signal in the diagram is:

1. **REGISTER:** The MN into VN's coverage area, request network registration to the VN (enabled with SIP proxy agent).

2. **SIP_407:** Is the response for Proxy authentication message that request its credentials to the MN.
3. **REGISTER/AAA:** The MN re-transmits the message for network registration, this time it had added its credentials to REGISTER message.
4. **REGISTER/AAA + VN id:** The VN forwards network registration message, before it had added its credentials into REGISTER/AAA message to HN.
5. **SIP_200:** The HN extracts the VN identifier and once verified the credentials and VN´s SLA related information, the HN informs to MN through 200_OK message that network registration has been successfully accomplished (the information follow the established path).
6. **SIP_200**: The MN receives 200 _OK message from HN through the VN.

6.2.2 Brokered Model

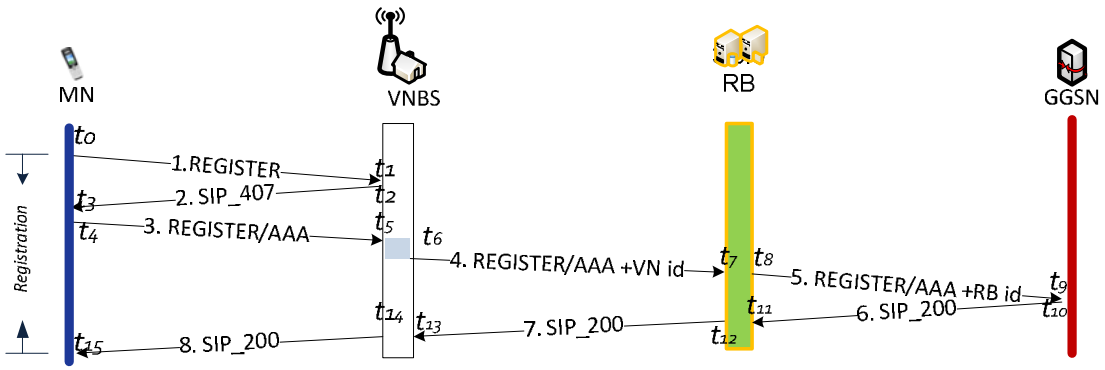

Figure 6.2 Signaling flow diagram for network registration VN.

The Figure 6.2 illustrate the signaling flow (and time) performed in the procedure of network registration for BM. We consider the *overall processing delay* for network registration like as the difference between t_0 and t_{15}. W*ireless SIP signal delay* is the length of time that a MN takes to put a message on the VN (WLAN) so that we take the average time value of (t_0 and t_1) and (t_4 and t_5). The *wireless processing delay* was taken of the time that spend the VNBS in process a message and emit a response (difference between t_6 and t_5).

The description for each signal in the diagram is:

1. **REGISTER:** The MN into VN's coverage area, request network registration to the VN (enabled with SIP proxy agent).
2. **SIP_407:** Is the response for Proxy authentication message that request its credentials to the MN.

3. **REGISTER/AAA:** The MN re-transmits the message for network registration, this time it had added its credentials to REGISTER message.
4. **REGISTER/AAA + VN id:** The MN re-request network registration, this time it had added its credentials to REGISTER/AAA message and VN's SLA related information.
5. **REGISTER/AAA + RB id:** Upon the reception of a registration message from a VN, the RB extracts the VN identifier, converts the message into DIAMETER and includes its proper credentials.
7. **SIP_200:** The HN extracts the RB identifier and once verified the credentials and VN´s SLA related information; the HN informs to MN through 200_OK message that network registration has been successfully accomplished (the information follow the established path).
6. The HN informs to MN through 200_OK message that network registration has been successfully accomplished, the information follow the established path.
7. **SIP_200**: The VN receives 200_OK message from HN to MN and forwards it to MN.
8. **SIP_200**: The MN receives 200_OK message from HN through the RB and VN.

6.2.3 Results' comparison of models discussed

To our analysis we consider the *overall processing delay* as the time difference since the MN initiates network registration and the reception of the 200 OK message. The simulations results (delays in seconds) for network registration are given in Table 6.5 for both models, in which the value showed in each scenario, is the average of this scenario taken of the twenty independents replications.

We can observe that in the average of overall processing delay for network registration, the cost in time of insert a broker element in a loose coupled architecture is in average equal to 17.2 μs *[0.0192774 seconds (spent in BM) minus 0.0192946 seconds (spent in CM)]* for network registration delay. Therefore, this cost can to be considered insignificant.

In addition for VN, we can observe the *average for authorization in wireless SIP signal delay* that shows only 9.9 μs of advantage in the BM for the VN, but practicly nothing *[0.0023923 seconds in CM minus 0.0023824 in BM]*. Also the *average processing on the VN* presents an little advantage for BM of 12 μs *[0.0041507 in CM minus 0.0041387 in BM]*. We consider an advantage for BM because spend minus time, but finally is undetectable.

Table 6.5 Results for network registration in methods discussed.

♦♍♏■♋❒♓□	NETWORK REGISTRATION					
	COOPERATIVE MODEL			BROKERED MODEL		
	Overall	Access Point in the VN		Overall	Access Point in the VN	
	Avg Proc Overall	Avg Wireless SIP	Avg W-Processing	Avg Proc Overall	Avg Wireless SIP	Avg W-Processing
♦🖃🖿🖃🖿	0.0190317	0.0072051	0.0040429	0.0190302	0.0068528	0.0040464
♦🖃🖹🖃🖿	0.0190738	0.0072014	0.0040677	0.0190796	0.0071853	0.0040682
♦🖃⧖🖃🖿	0.0190773	0.0069343	0.0040679	0.0190769	0.0068740	0.0040679
♦🖃🖿🗀🖃🖿	0.0190737	0.0069132	0.0040676	0.0190737	0.0071517	0.0040676
♦🖃🖹🗀🖃🖿	0.0190660	0.0068683	0.0040671	0.0190583	0.0068629	0.0040702
♦🖃🖿🖃🖳	*0.0197008*	0.0013827	0.0041262	0.0192663	0.0013828	0.0041220
♦🖃🖹🖃🖳	0.0194168	0.0013895	0.0041734	0.0194022	0.0013898	0.0041316
♦🖃⧖🖃🖳	0.0193061	0.0013896	0.0041661	0.0193223	0.0013896	0.0041351
♦🖃🖿🗀🖃🖳	0.0192574	0.0013895	0.0041908	0.0192759	0.0013895	0.0041762
♦🖃🖹🗀🖃🖳	0.0191797	0.0013893	0.0041780	0.0192499	0.0013869	0.0040170
♦🖃🖿🖃🖿🗀	0.0192874	0.0006914	0.0092813	0.0192706	0.0006914	0.0042176
♦🖃🖹🖃🖿🗀	0.0193420	0.0006947	0.0041848	0.0193471	0.0006949	0.0041786
♦🖃⧖🖃🖿🗀	0.0193091	0.0006948	0.0041667	0.0192893	0.0006948	0.0041762
♦🖃🖿🗀🖃🖿🗀	0.0192911	0.0006947	0.0041908	0.0193601	0.0006947	0.0042425
♦🖃🖹🗀🖃🖿🗀	0.0193665	0.0006946	0.0041832	0.0192987	0.0006934	0.0041677
♦🖃🖿🖃🖿🖳	0.0193725	0.0004609	0.0041685	0.0194301	0.0004609	0.0041665
♦🖃🖹🖃🖿🖳	0.0194304	0.0004632	0.0041599	0.0194571	0.0004633	0.0042047
♦🖃⧖🖃🖿🖳	0.0193931	0.0004632	0.0041558	0.0194069	0.0004632	0.0041400
♦🖃🖿🗀🖃🖿🖳	0.0194522	0.0004632	0.0041882	0.0193693	0.0004632	0.0042055
♦🖃🖹🗀🖃🖿🖳	0.0194643	0.0004631	0.0041877	0.0194827	0.0004623	0.0041713
♑❖♏❒♋♑♏♦	**0.0192946**	**0.0023923**	**0.0041507**	**0.0192774**	**0.0023824**	**0.0041387**

The Figures 6.3 and 6.4 demonstrate that the behavior in both models is similar, with one considerable variation in S.1.5 (with 5 MNs at 1 m/s of speed) for the CM.

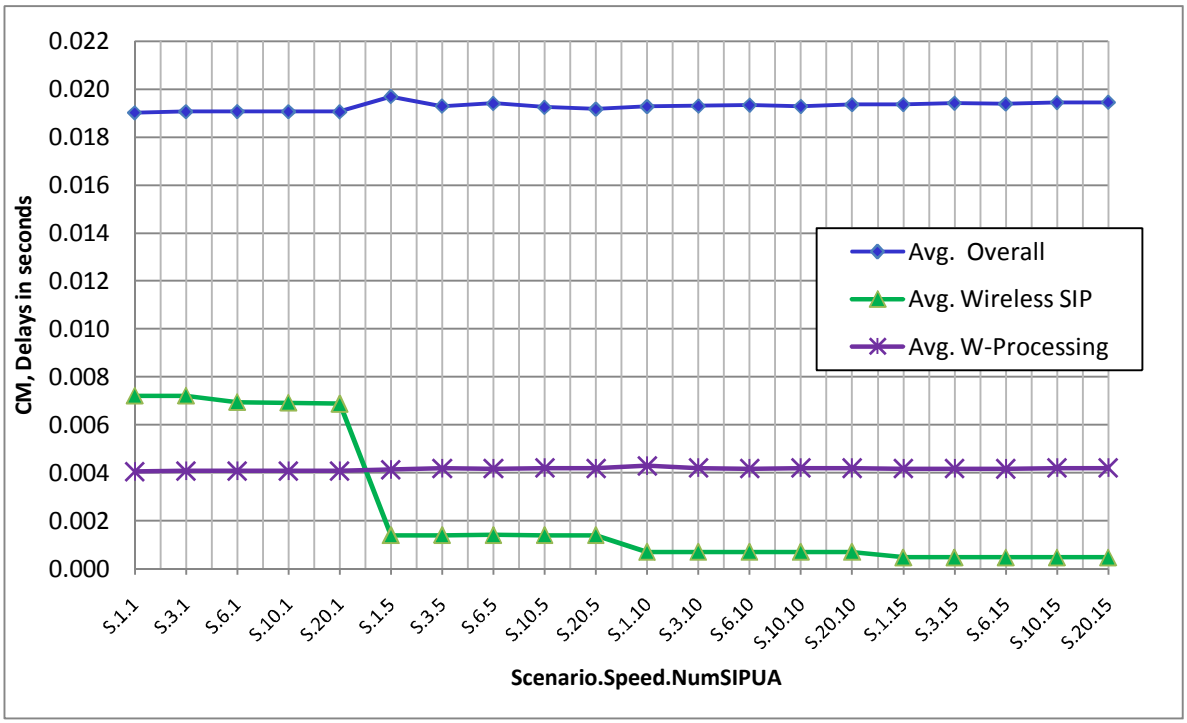

Figure 6.3 Graph for network registration in CM .

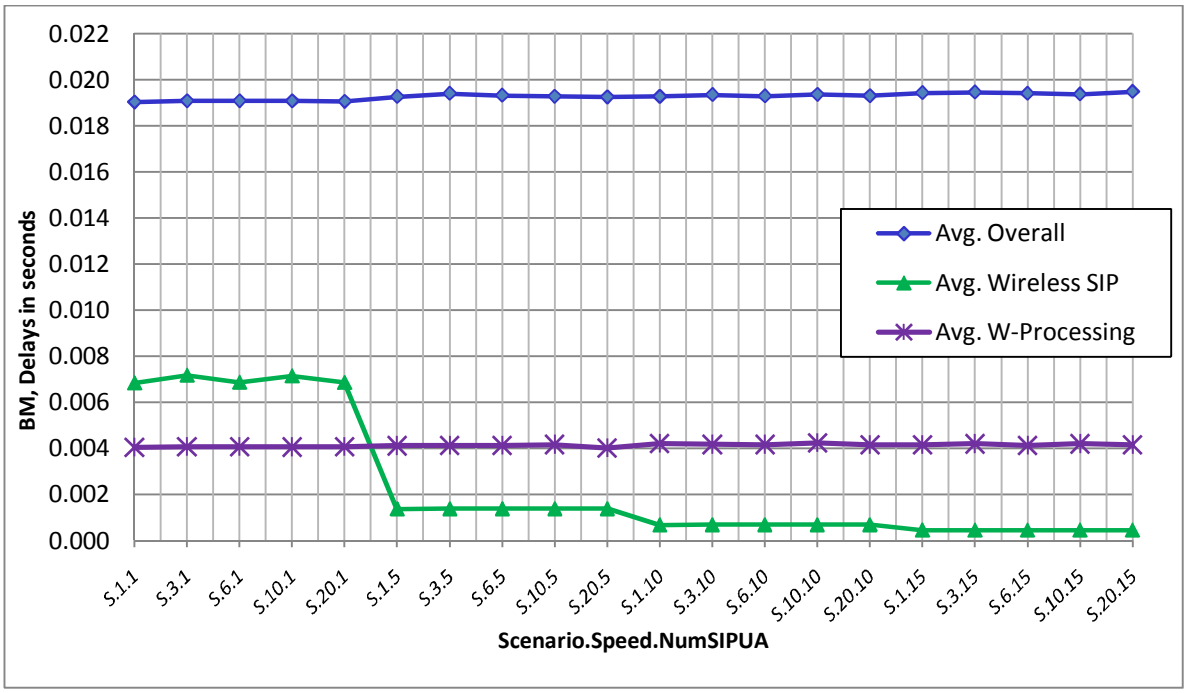

Figure 6.4 Graph for network registration in BM .

The Figure 6.5 illustrates a graph with overall network registration delays for both models, where we observed clearly the worst case (delay) in the peak generated by scenario S.1.5, this is because in the run simulation with seed 66, the 5 nodes requires for authentication twice retransmission of the REGISTER/AAA message, then we founded an overall for this seed of 0.0269781 seconds which increase the average overall for this scenario of 0.0197008 seconds.

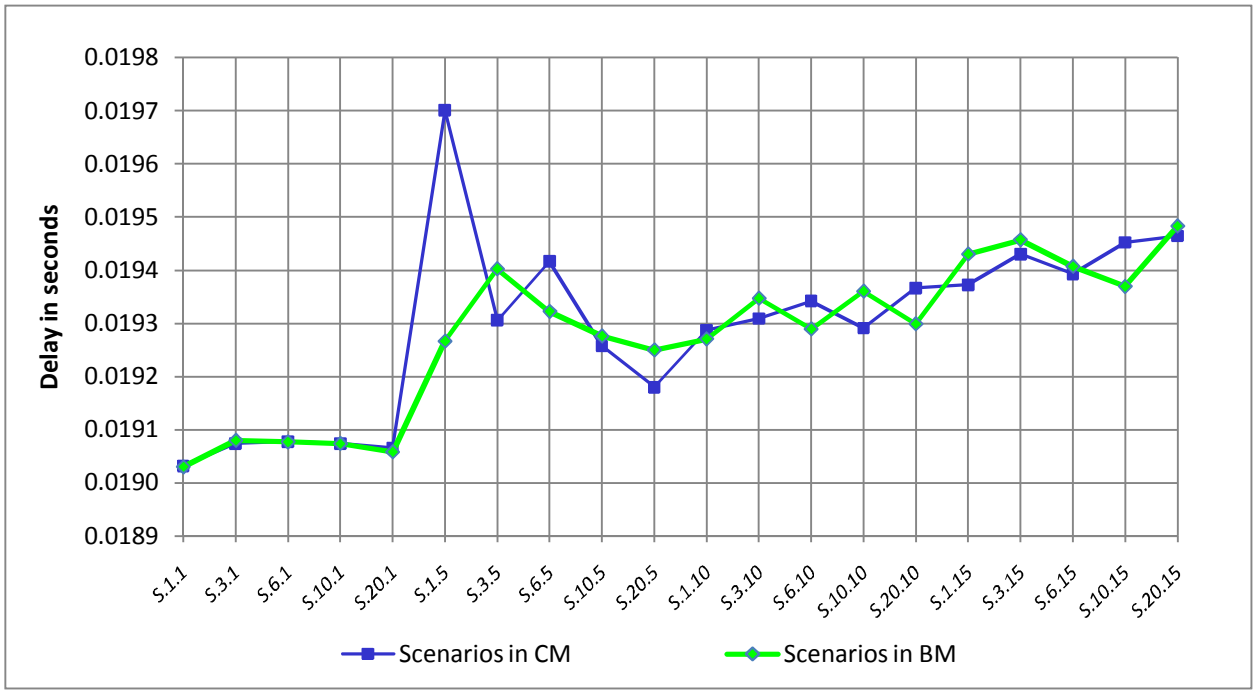

Figure 6.5 Graph for overall network registration delays in both models.

In the Figure 6.6 for CM and the Figure 6.7 for BM are showed that except the scenario S.1.5 the behavior for both models in the overall for authentication process is analogous. The peak that presents the scenario S.1.5 is the worst case (major overall authentication delay) that was described in previously.

We can infer that the overall network registration with SIP signaling is independently of the MN's speed because only vary around 0.17ms by scenarios in according with the number of MNs.

Figure 6.6 Graph for overall registration delays in CM by speed.

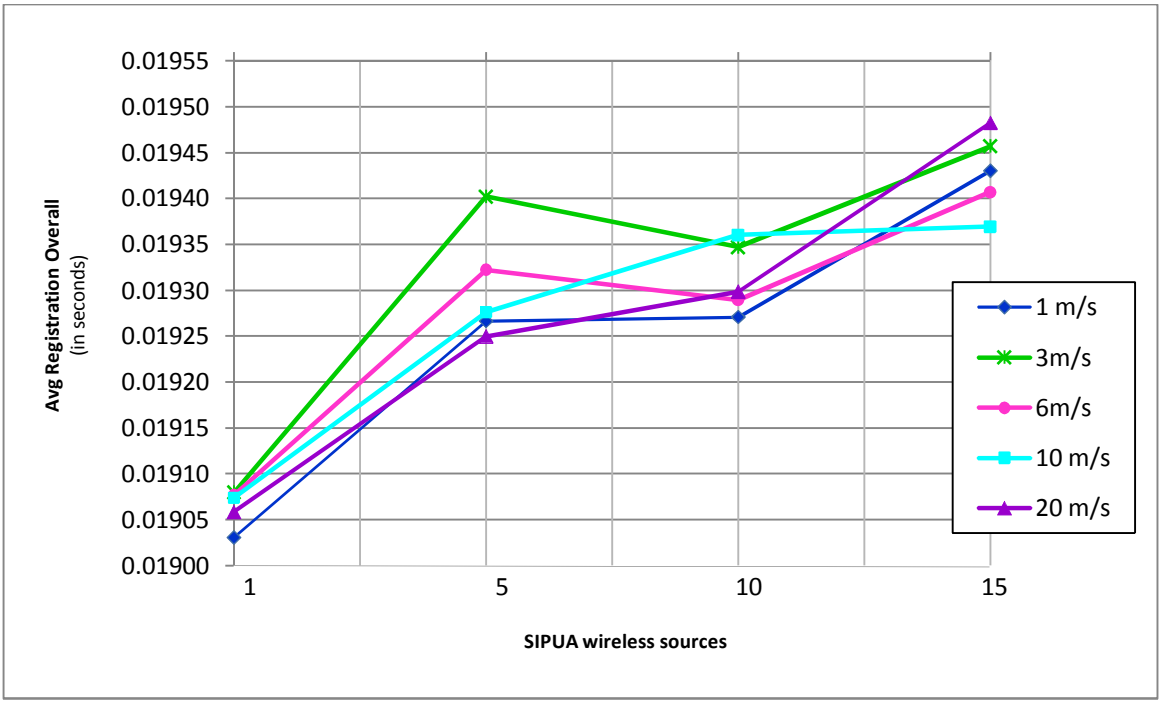

Figure 6.7 Graph for overall registration delays in BM by speed.

From the Table 6.5, we infer that the *wireless SIP signal delay* is inversely proportional to the number of MN that request authentication in the VN (please observe the Figures 6.3 and 6.4). For clarify this, we generated a linear projection with values founded in the average of

computational simulations for 1MN and we get the behavior of 1MN to 15 MNs at the same speeds showed in Figure 6.8, where the axis for y is the delay in seconds, and the axis for x is the scenario with speed of the node and the number of wireless nodes that request authentication.

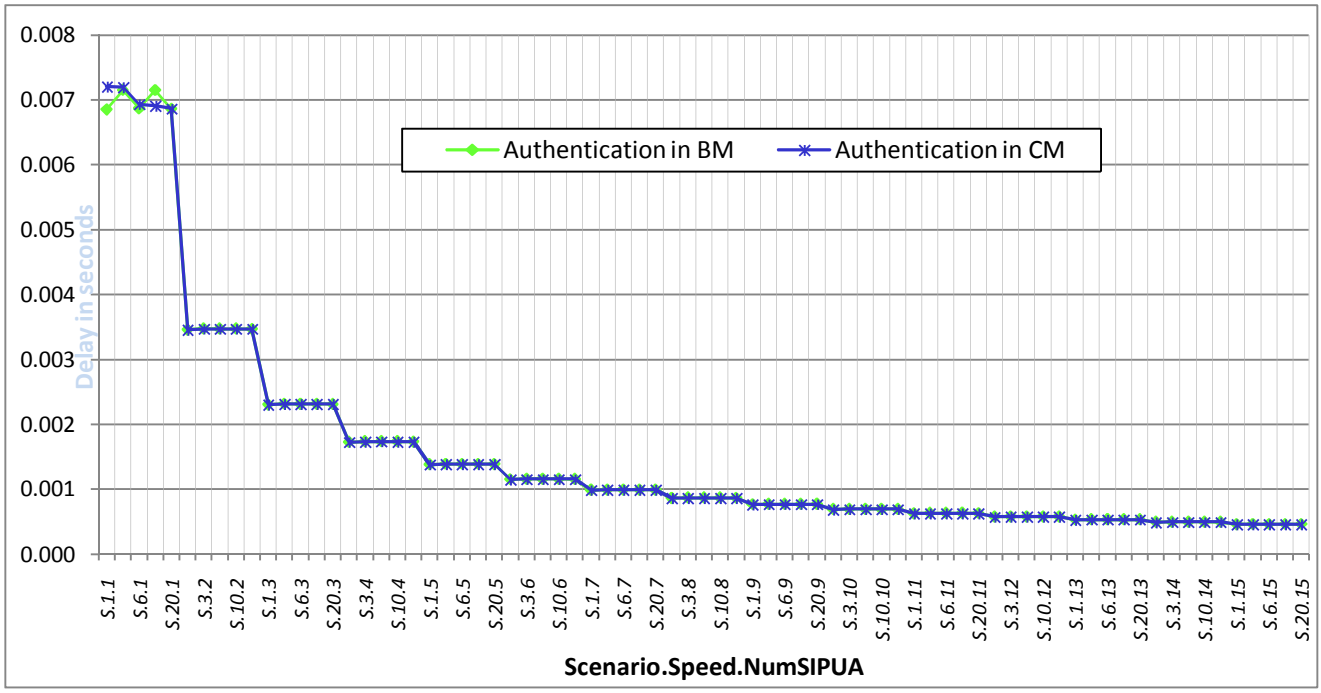

Figure 6.8 Graph for authentication wireless SIP signal delay.

From the results presented at the moment we can deduce that the CM and BM has the same performance in function of delays and we can not conclude with is better of both.

6. 3 SESSION INITIATION IN MODELS DISCUSSED

6.3.1 Cooperative Model

The flow of signaling in this procedure is showed in the Figure 6.9. We consider the *overall processing delay* for session initiation like as the difference between t_{53} and t_0. W*ireless SIP signal delay* is the length of time that a MN takes to put a message on the VN (WLAN) so that we take the time value of t_0 and t_1.W*ireless processing delay* was taken of the time that spend the VNBS in process a message and emit a response (t_4-t_2). Once the session has been established by the receipt of the 200 OK and the transmission of the ACK, the session must be released by the BYE method.

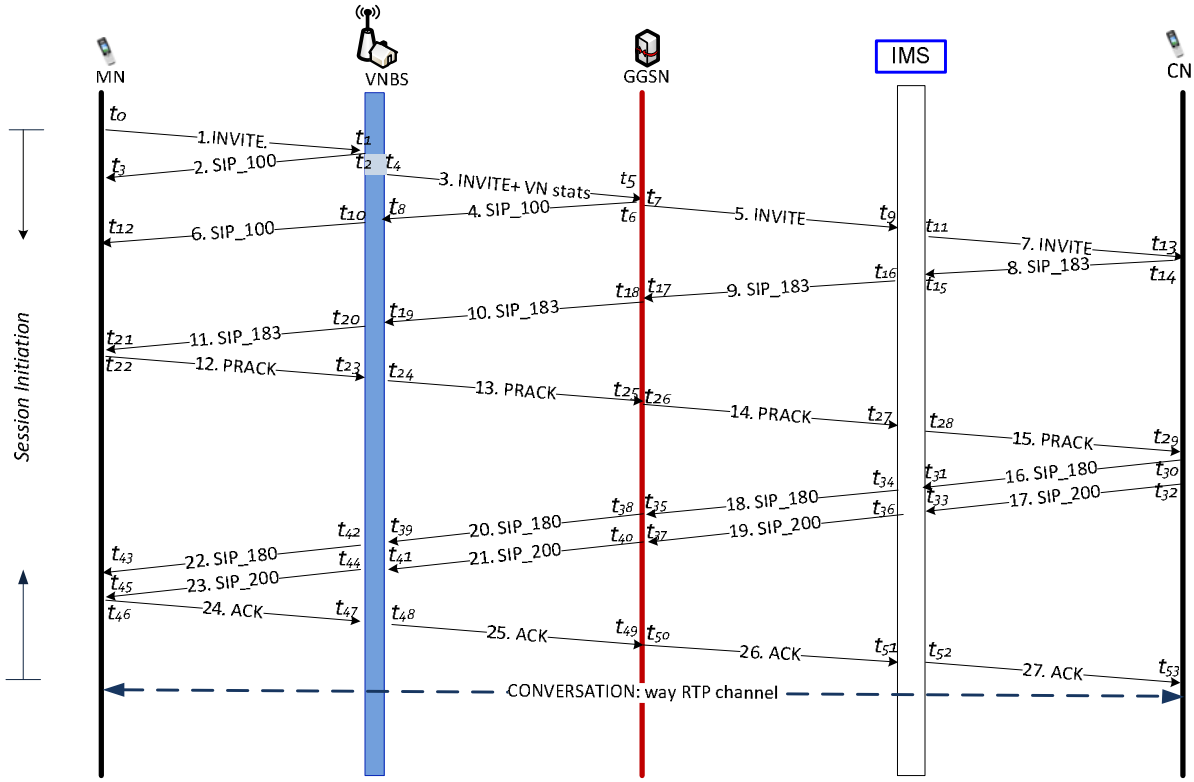

Figure 6.9 Signaling flow diagram for session initiation in roaming Cooperative Model.

The description for each signal in the diagram is:

1. **INVITE:** SIP UA into MN (Alice) initiates a call session to SIP UA into CN (Bob). The INVITE message contains the IP address and call details of the session. MN places the call to a SIP Proxy Server located in the VN.
2. **SIP_100**: On receiving INVITE message, SIP Proxy Server send a 100_Trying response to MN, indicating that it is trying to establish the call.
3. **INVITE+VN stats:** Once verified its proper SLA requirements, the VN attaches into the SIP_INVITE message current networks statistics and then forwards it to the RB.
4. **INVITE**: The HN process the message and queries the reputation list, if has an acceptable reputation, redirect the INVITE message to CN through IMS. (The HN includes the IMS, access control and GGSN).
5. **SIP_100:** The SIP proxy into HN sends to MN through VN the 100 trying response to prevent retransmission.
6. **INVITE:** Through IMS the HN send INVITE to the MN.
7. **SIP_100:** VN redirects the 100 trying response to MN.
8. **SIP_183:** This response is used by SIP UA in the CN to notify to SIP UA into MN (originator) that the request is being processed.

9. **SIP_183**: The IMS receives and re-send the session is in progress message to the caller.
10. **SIP_183**: The GGSN in HN receives and re-send the session is in progress message to the caller.
11. **SIP_183:** The VN receives from HN and re-send the session is in progress message to the MN.
12. **PRACK:** The PRACK request plays the same role as ACK (acknowledgement), but for provisional responses. Therefore the SIP UA in the MN send it to SIP UA into CN through the loose coupled architecture in Cooperative Model.
13. **PRACK:** VN receives the PRACK message and re-send it to the CN through the HN.
14. **PRACK:** GGSN receives and re-send the message to the IMS.
15. **PRACK:** IMS finally receives and re-send the message to the CN.
16. **SIP_180**: The SIP UA in the CN triggers the transmission of ringback tones to the caller through HN and VN.
17. **SIP_200** The 200 OK is the final response to a request from the CN to MN.
18. **SIP_180**: Transmission of ringing message over HN.
19. **SIP_200**: The GGSN receives from IMS.
20. **SIP_180:** Transmission of ringing message of HN's end point to VN.
21. **SIP_200**: GGSN re-transmit the 200 OK message to VN.
22. **SIP_180**: Last ringing message form VNBS to MN.
23. **SIP_200:** VN receives the 200 OK message from HN and redirects (finally) it to the SIP UA in the MN.
24. **ACK – 27.ACK**: Upon a receipt of the 200 OK the SIP UA in the MN send the ACK back upstream to the SIP UA into CN, and a session is established.

6. 3.2 Brokered Model

The Figure 6.10 detailed the signaling flow diagram for session initiation procedure in BM. We consider the *overall processing delay* for network registration like as the difference between t_{67} and t_0; the *wireless transmission delay* is the length of time it takes to put a packet on the wireless media (MN to VNBS and VNBS to MN). W*ireless SIP signal delay* is the length of time that a MN takes to put a message on the VN (WLAN) so that we take the time value of t_0 and t_1. The *wireless processing delay* was taken of the time that spend the VNBS in process a message and emit a response ($t_4 – t_2$). Once the session has been established by the receipt of the 200 OK and the transmission of the ACK, the session must be released by the BYE method.

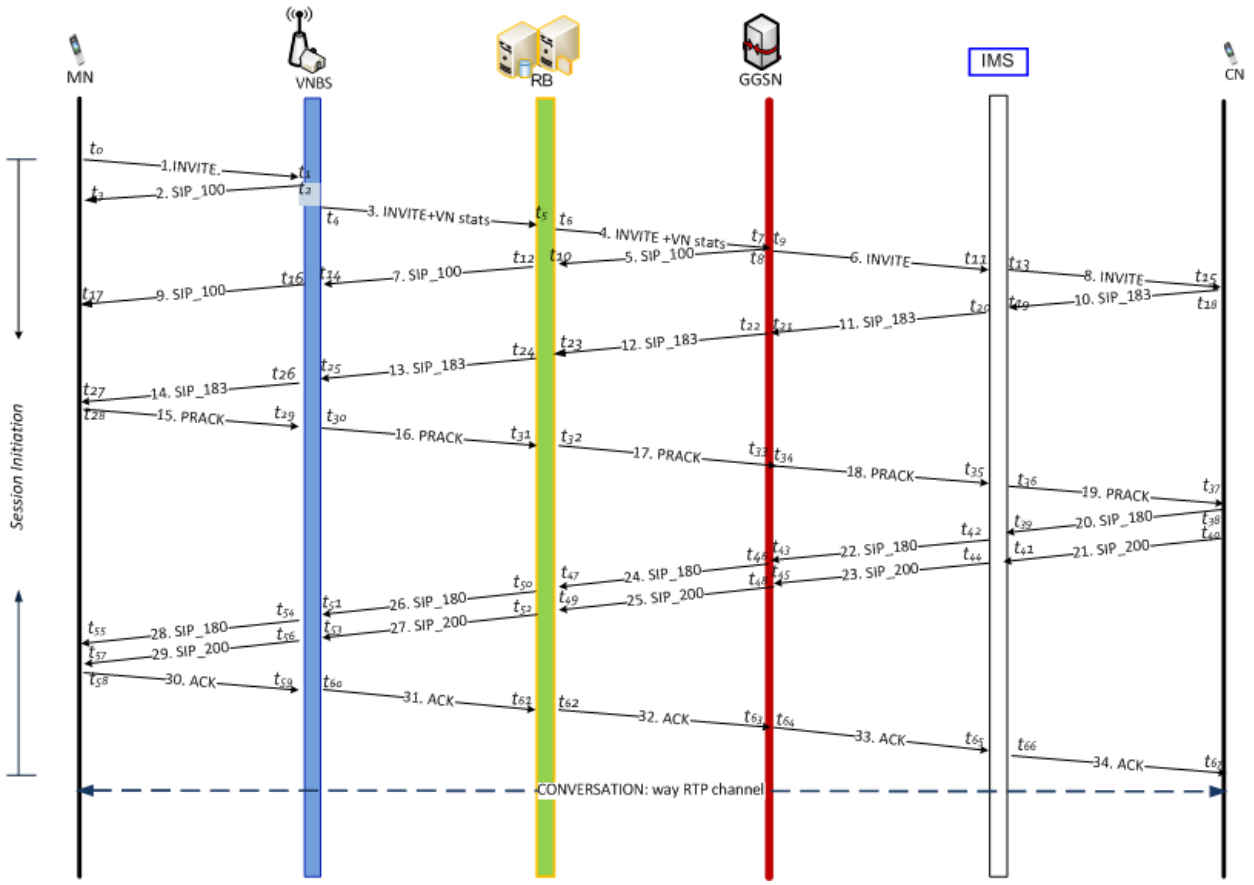

Figure 6.10 Signaling flow diagram for session initiation in roaming Brokered Model.

The description for each signal in the diagram is:

1. **INVITE:** SIP UA into MN (Alice) initiates a call session to SIP UA into CN (Bob). The INVITE message contains the IP address and call details of the session. MN places the call to a SIP Proxy Server located in the VN.
2. **SIP_100**: On receiving INVITE message, SIP Proxy Server send a 100_Trying response to MN, indicating that it is trying to establish the call.
3. **INVITE+VN stats:** Once verified its proper SLA requirements, the VN attaches into the SIP_INVITE message current networks statistics and then forwards it to the RB.
4. **INVITE+VN stats**: After receives the INVITE+VN stats, the RB process it message and queries VN's acceptable reputation, then redirects the message to the HN which is the entity that will deliver, upon authorization, the message to the other peer.
5. **SIP_100:** The SIP proxy into HN sends to SIP UA into MN the 100 trying response to prevent retransmission over the Brokered Model for loose coupled architecture.
6. **INVITE**: The HN authorize and redirect the INVITE message to SIP UA into CN through IMS. (The HN includes the IMS, access control and GGSN).

7. **SIP_100:** The SIP RB agent sends to SIP UA within MN through the SIP proxy agent into VN the 100 trying from HN.
8. **INVITE**: IMS redirects it message to SIP UA into CN (called node).
9. **SIP_100:** Finally, the SIP UA into MN receives the 100 trying from HN.
10. **SIP_183 –14. SIP_183:** This response is used by SIP UA in the CN to notify to SIP UA into MN (originator) that the request is being processed.
15. **PRACK – 19. PRACK:** Is a provisional response for acknowledgement sent from SIP UA (in the MN) to SIP UA (into CN) through the loose coupled architecture in BM.
20. **SIP_180, 22. SIP_180, 24. SIP_180, 26. SIP_180 and 28. SIP_180**: The SIP UA in the CN triggers the transmission of ringback tones to the caller through HN and VN.
21. **SIP_200, 23. SIP_200 25. SIP_200, 27. SIP_200, 29. SIP_200:** The 200 OK is the final response to a request from the CN to MN.
30. **ACK – 34.ACK**: Upon a receipt of the 200 OK the SIP UA in the MN send the ACK back upstream to the SIP UA into CN, and a session is established.

6.3.3 Results' comparison of models discussed

The average of simulations results (delays in seconds) in each scenario are detailed in the Table 6.6. nTo our analysis we consider the *overall session initiation delay* as the time difference since the MN start session initiation process and the reception of the 200 OK message.

We can detect in the *average of overall processing delay for authorization*, that the cost in time of insert a broker element in a loose coupled architecture is in average equal to 800.8 ms *[1.7055611 seconds (spent in BM) minus 0.9046698 seconds (spent in CM)]*. Consequently, we observed that that the cost in time delay of insert a broker represent an 88.52% more that is an abundant extra delay relative to the CM. Please see the Figure 6.11 which show a graph for overall processing session initiation delay in both models. In addition, we present two graphs order by speed, one for CM and other for VM, showed in Figure 6.12 and 6.13 where we can compare the differences of the methods.

Principally, we founded that scenario S.1.5 (with 5MNs at 1 m/s) presents in average an increment of 0.1ms more than the other scenarios at same speed. The minimum average value for overall authorization (1.6925545 seconds) was founded the scenario S.20.5 (with 5 MNs at 20 m/s), is due that in simulation average value for one of the twenty independent simulations (seed 198) we get and overall of 1.45026 seconds. In contrast in the scenario S.1.5 we get the worst case with an overall delay of 1.91727 seconds in the run simulation with a seed of 66; this

is because the MN2 to MN6 request retransmission of the SIP INVITE message, consequently we get in average 1.715963 seconds which affecte the average logon process in this scenario.

Table 6.6 Results for session initiation in methods discussed.

	SESSION INITIATION					
	COOPERATIVE MODEL			BROKERED MODEL		
	Overall	Access Point in the VN		Overall	Access Point in the VN	
	Avg Proc Overall	Avg Wireless SIP	Avg W-Processing	Avg Proc Overall	Avg Wireless SIP	Avg W-Processing
	0.9047995	0.0080751	0.0106913	1.7056514	0.0080753	0.0106583
	0.9047654	0.0080693	0.0106725	1.7051895	0.0080700	0.0106740
	0.9047663	0.0080696	0.0106732	1.7051890	0.0080695	0.0106730
	0.9047649	0.0080693	0.0106725	1.7051890	0.0080693	0.0106724
	0.9047644	0.0080691	0.0106723	1.7052050	0.0080731	0.0106752
	0.9047971	0.0016787	0.0106396	1.7159630	0.0016649	0.0106486
	0.9044677	0.0016189	0.0104506	1.7053000	0.0016401	0.0104710
	0.9043355	0.0016070	0.0103913	1.7051575	0.0016350	0.0104050
	0.9045027	0.0016348	0.0104928	1.7053020	0.0040019	0.0104864
	0.9045342	0.0016444	0.0104875	1.6999725	0.0016132	0.0104822
	0.9045659	0.0008291	0.0105313	1.7052864	0.0011865	0.0105072
	0.9047561	0.0008299	0.0111454	1.7052630	0.0008298	0.0104819
	0.9045547	0.0008415	0.0105001	1.7052990	0.0011709	0.0105564
	0.9044824	0.0008203	0.0104831	1.7054130	0.0008141	0.0105173
	0.9045301	0.0008190	0.0104632	1.7053090	0.0008181	0.0105204
	0.9045689	0.0005459	0.0105131	1.7052780	0.0005459	0.0104883
	0.9045707	0.0005450	0.0105294	1.7053085	0.0005461	0.0105291
	0.9045157	0.0005397	0.0104671	1.7053260	0.0009220	0.0105203
	0.9045862	0.0005535	0.0105157	1.7053610	0.0005517	0.0105221
	0.9046121	0.0005443	0.0105277	1.7052585	0.0009266	0.0104920
	0.9046698	**0.0027702**	**0.0105760**	**1.7055611**	**0.0029612**	**0.0105491**

In addition the *average for authorization in wireless SIP signal delay* shows 191 μs more in the BM, *[0.0029612 seconds in BM minus 0.0027702 in CM]*. For *average wireless processing on the VN* the CM presents 26.9 μs more of delay *[0.0105760 in CM minus 0.0105491 in BM]* which can be consider negligible. Based on this, we infer that the idea of that broker reduces the load in the devices of network technologies and provide better throughput is not real.

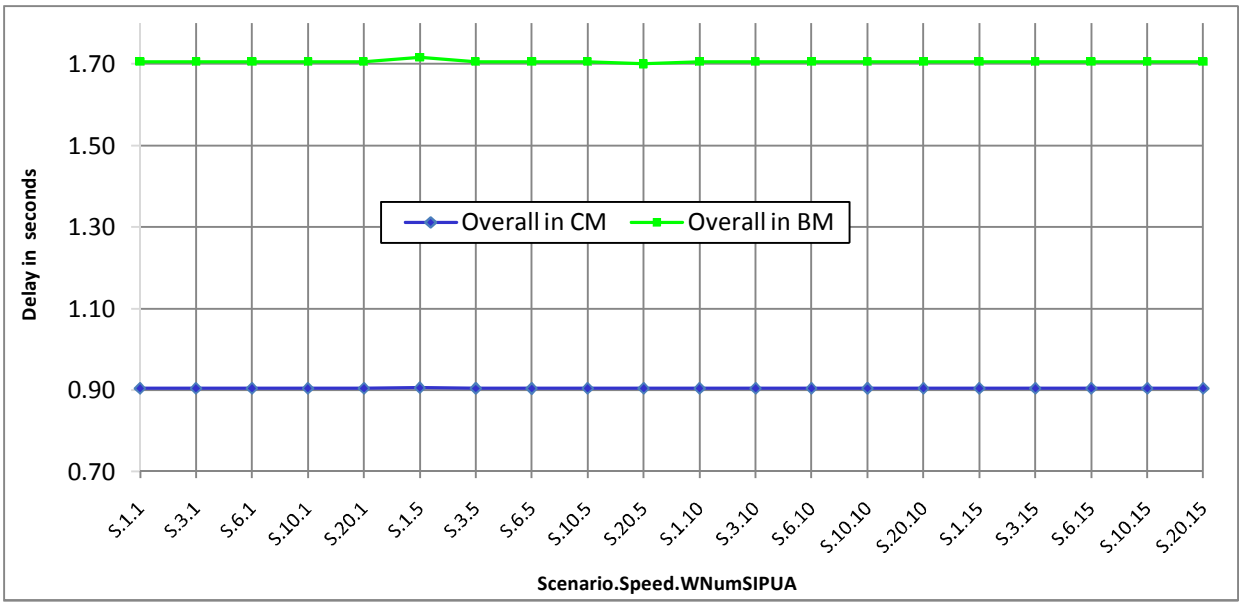

Figure 6.11 Graph for overall session intitiation delay in both models.

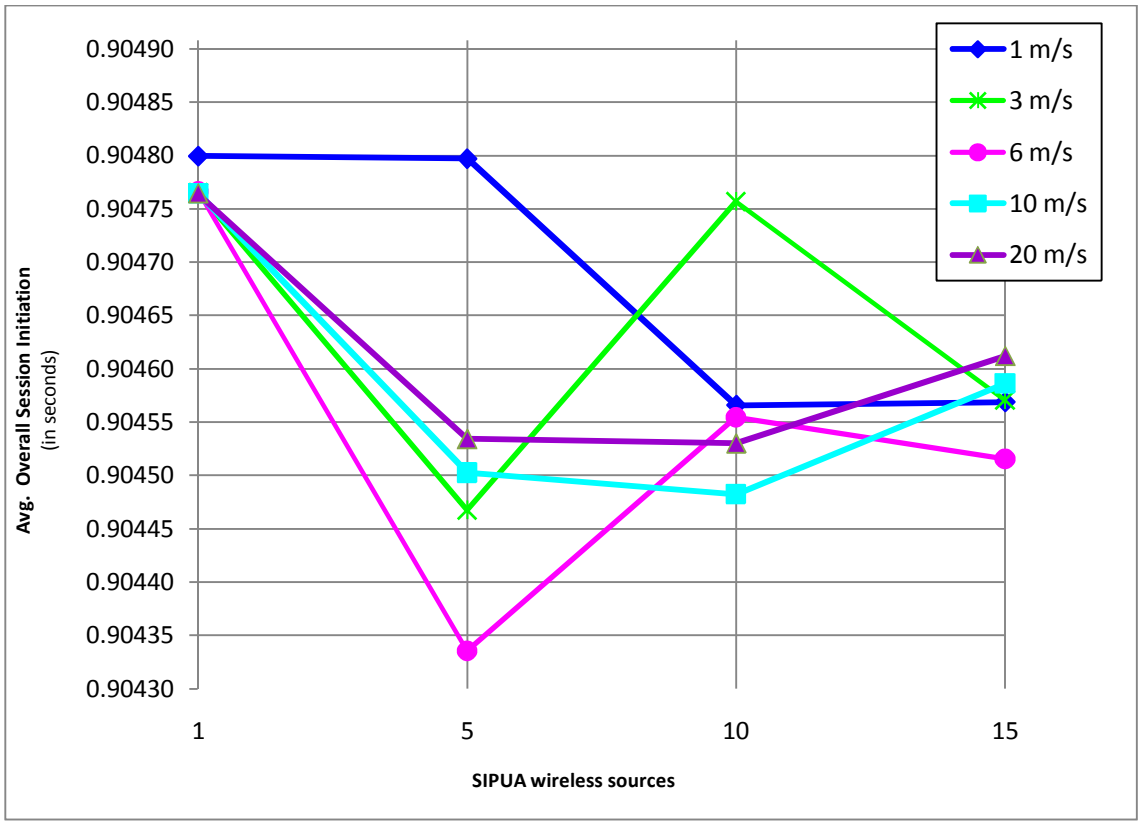

Figure 6.12 Graph for overall session intitiation delay CM.

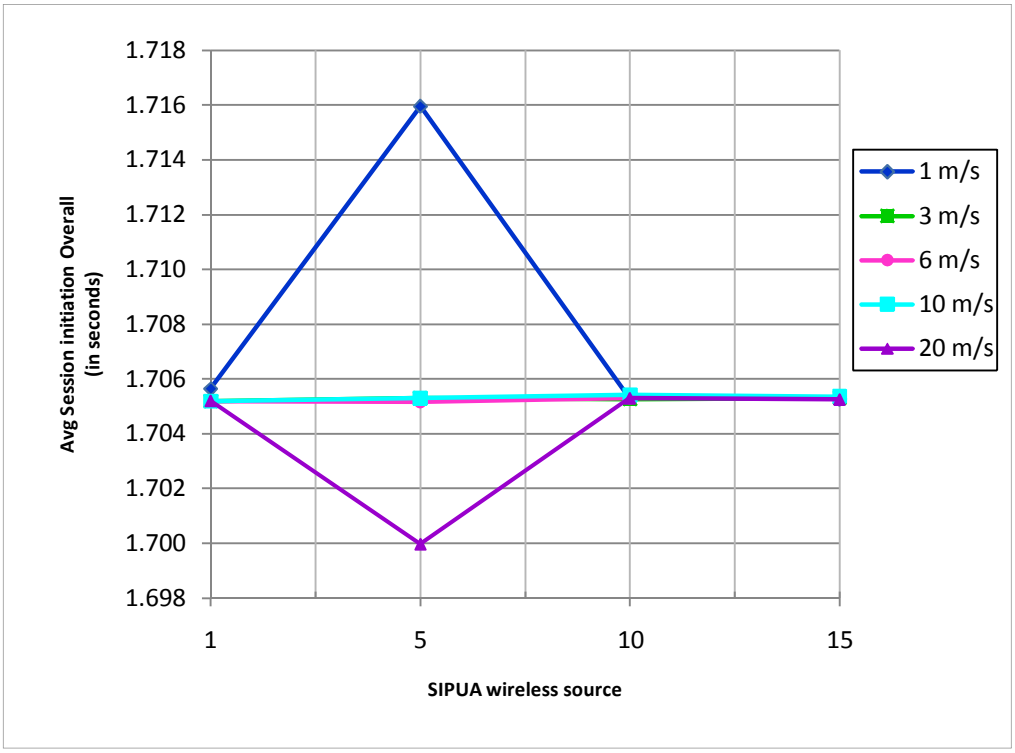

Figure 6.13 Graph for overall session intitiation delay in BM.

To illustrate this, the graphs in the next two Figures show the behavior of the VN (WLAN) in each model. In Figure 6.14 (Graph for CM and wireless VN behavior in session intitiation) the scenario S.3.10 presents the worst delay with value of 0.111454 seconds because in simulation with seeds 55 and 66 the INVITE message presents time expired so that request retransmission of message of MN to VN.

We can observed in Figure 6.15 (Graph for BM and wireless VN behavior in session intitiation) that for the scenario S.10.5 (with 5 MNs at 10 m/s) the values obtained are not linear, it is because for the simulations results with the seeds between 22 and 110 presented twice the request for retransmission the INVITE message which increase the average for this scenario.

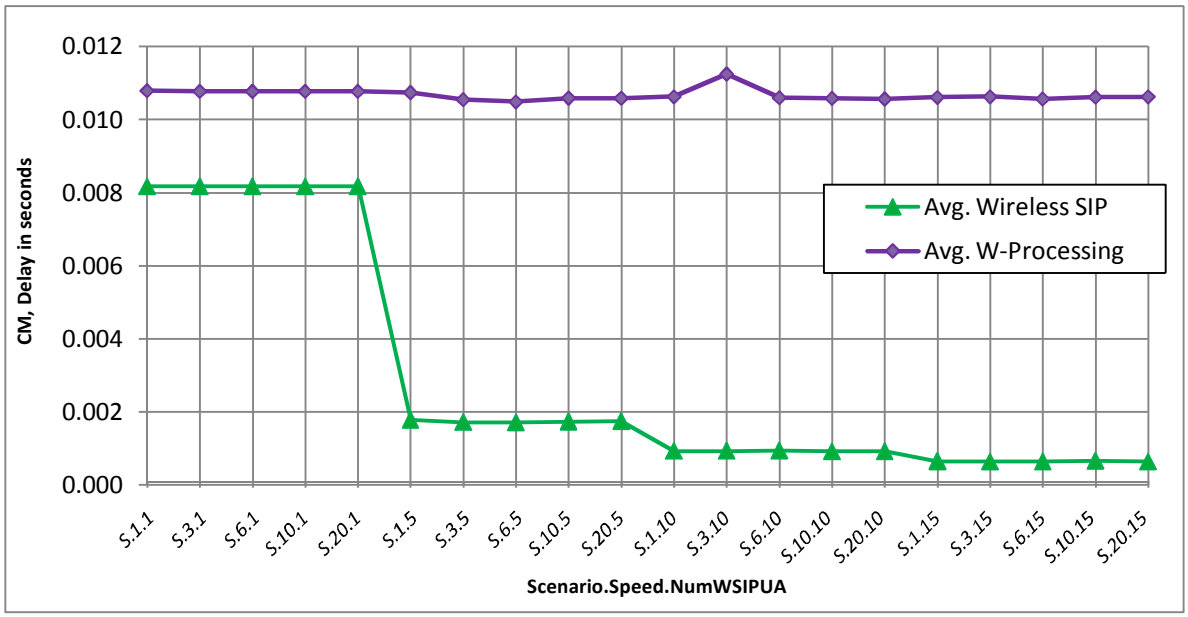

Figure 6.14 Graph for CM and wireless VN behavior in session intitiation.

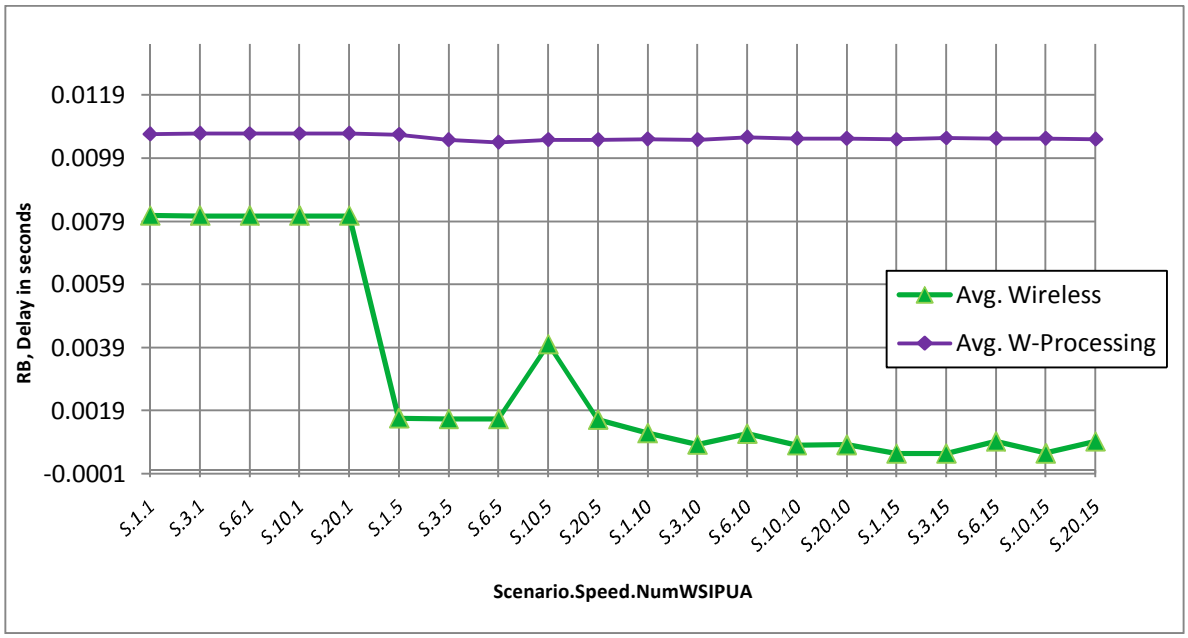

Figure 6.15 Graph for BM and wirelessVN behavior in session intitiation.

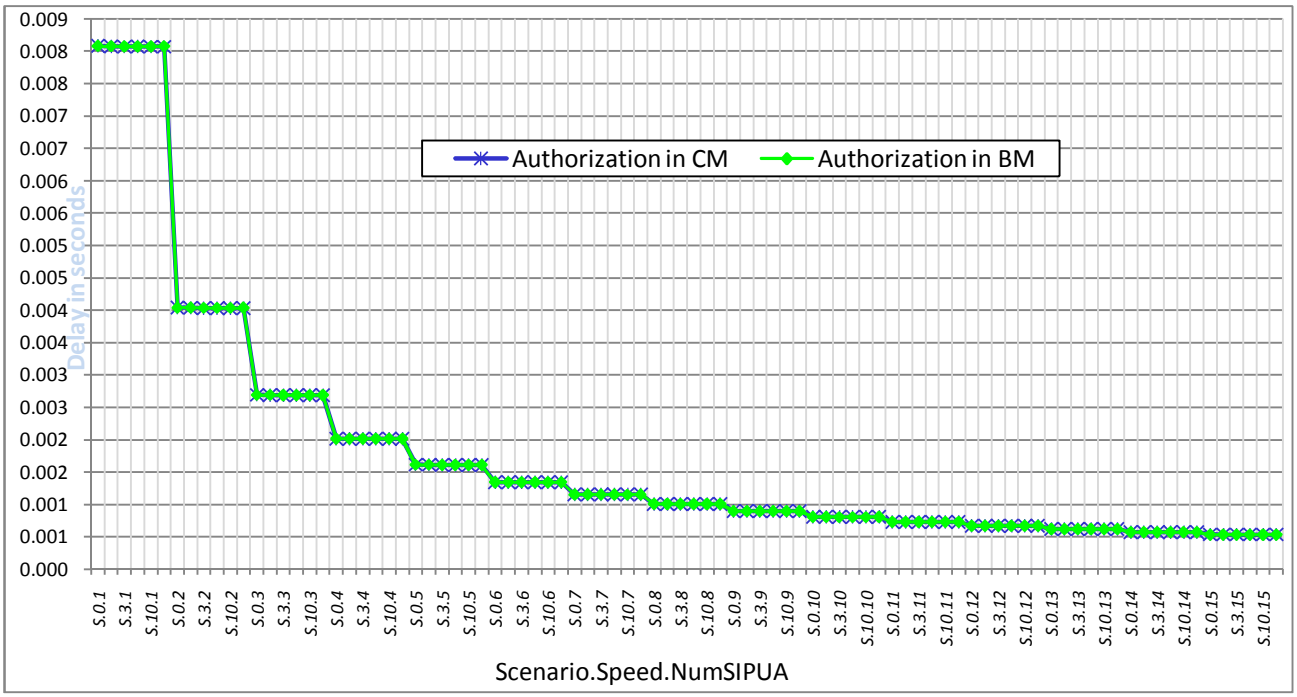

Figure 6.16 Graph for authorization wireless SIP signal delay.

From the Table 6.6, we infer that the *wireless SIP signal delay* is inversely proportional to the number of MNs that request authorization in the VN (please observe the Figures 6.14 and 6.15). For clarify it, we generated a linear projection with values founded in the average of computational simulations for 1MN and we get the behavior of 1MN to 15 MNs which is showed in the Figure 6.16.

Therefore, we observed that the overall delay in the authorization process as in authentication process, is not affected by the speed of the MN in the coverage area of VN, verifying that the SIP protocol work in the session layer of OSI model.

From the results presented for session inititation procedure in terms of delay, we can deduce that the BM is not better that CM.

Chapter 7

CONCLUSIONS AND FURTHER RESEARCH

This thesis evaluates the performance towards enabling, supporting mobility and control session for heterogeneous networks based on SIP signaling and roaming agreements. The mobility support system provides mobility management at application layer through SIP agents in two different models for loose coupled method integration. We have introduced a Cooperative Model and Brokered Model based on SIP roaming architecture to enable service mobility between cellular and unlicensed wireless networks and technical part of SLAs.

In our roaming architecture, for validation purposes, we decided to evaluate the impact of traffic congestion in the VN on the roaming process by computer simulations.

Based on delays get for overall procedure, wireless processing and wireless SIP signal for authorization and authorization, we infer that the insertion of the broker not throws results that permits to affirm the theory that in Brokered Model *each type of network work in the functions for that they were designed* it is due to we only put focus in the VN delay.

In addition we have demonstrated that the performance (based on overall delay) of the proposed BM by Oscar Salazar in [16] is not better than CM using SIP enhancement.

We found that *the addition of enhancement signaling SIP* following the models for integration of services by SAHARA project [39] is feasible.

Our future works comprises the development of a mathematical model and the enabling of roaming heterogeneous between other network technologies to NG networks. Furthermore, we will enable the service mobility between cellular and unlicensed wireless networks in bidirectional form, this is, the GPRS technology could will be the visited network and the WLAN technology the home network. Also we pretend to analize the behavior of both models under more than one VN.

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Appendix A

NETWORK SIMULATOR 2

In the path to prepare the environment to develop our simulations have various technical details referred with the selection of the distributions of Linux and the version of NS2 to work with the SIP Module. The simulations realized in this project was running under two distinct platforms based on Ubuntu 9.04 and Suse 11.1 confirming that NS2 is independent of operating system because is only an interprete.

This appendix is composed by three parts: First is presented a brief overview of NS2. Therefore, in second and third part is exposed the instructions to prepare the environment used with SIP Module by Ruis Prior [51] in NS 2.33[50] for each Linux distribution utilized. Second part refers to the steps to prepare the NS2 under Linux Ubuntu 9.04 and the last part listed the instructions that correspond to reproduce the environment used under Suse 11.1. Additional information about wireless networks can be founded in the chapter sixteen of [50] and in [49]. The details to install Ubuntu 9.04 and Suse 11.1 are not included.

A.1 Overview NS2

Network Simulator (Version 2), known as NS2, is simply an event driven simulation tool that has proved useful in studying the dynamic nature of communication networks. Simulation of wired as well as wireless network functions and protocols (e.g., routing algorithms, TCP, UDP) can be done using NS2.

Birth in 1989, ever several revolutions and revisions have marked the growing maturity of the tool, thanks to substantial contributions from the players in the field [51]. Among these are the University of California and Cornell University who developed the REAL network simulator, the foundation which NS is based on. Since 1995 the *Defense Advanced Research Projects Agency* (DARPA) supported development of NS through the *Virtual Inter Network Testbed* (VINT) project [50]. Currently the *National Science Foundation* (NSF) has joined the ride in development. Last but not the least, the group of researchers and developers in the community are constantly working to keep NS2 strong and versatile.

NS2 consist of two key languages [50], [51]: C++ and *Object-oriented Tool common language* (OTcl). C++ defines the internal mechanism of the simulations objects and the OTcl sets up the

simulation by assembly and configuring the objects as well as scheduling discrete events. Both languages are linked using TclCL.

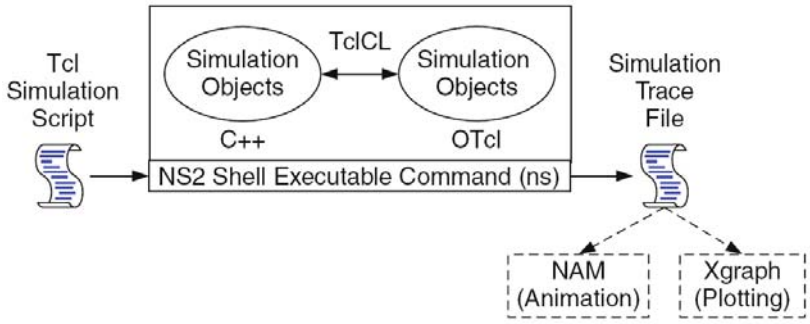

Figure A.1 Basic Architecture for NS2 [49].

After simulation, NS2 outputs either text based or animation based simulation results. To interpret these results graphically and interactively, tools such as *Network AniMator* (NAM) and XGraph are used. To analyze a particular behavior of the network [49], users can extract a relevant subset of text based data and transform it to a more conceivable presentation. Like is showed in the Figure A.1, for develop a simulation based on NS2, can be used an easy to use scripting language to configure a network, and observe results generated by NS2.

NS2 is a free simulation tool, which can be obtained from [50]. It runs on various platforms including UNIX (or Linux), Windows, and Mac systems. The discussion in this appendix is based on a two Linux platforms. NS2 source codes are distributed in two forms: the all-in-one suite and the component-wise. With the all-in-one package, users get all the required components along with some optional components. This is basically a recommended choice for the beginners. This package provides an “install” script which configures the NS2 environment and creates NS2 executable file using the “make” utility.

The current all-in-one suite consists of the following main components:

- NS release 2.33,
- Tcl/Tk release 8.4.18,
- OTcl release 1.13, and
- TclCL release 1.18.
- NAM release 1.13: NAM is an animation tool for viewing network simulation traces and packet traces.
- Zlib version 1.2.3: This is the required library for NAM.
- Xgraph version 12.1: This is a data plotter with interactive buttons for panning, zooming, printing, and selecting display options.

In the next section of is included the instructions to install additional packages required to run NS2 under Linux Ubuntu 9.04 and under Linux Suse 11.1. The packages that need to be installed are:

- Development: gcc, gcc-objc, gcc-g++, make
- Utils: patch
- X11: xorg-x11-base, xorg-x11-devel

A.2 NS2 all-in-one under Ubuntu 9.04

The procedure to install NS 2.33 under Ubuntu 9.04 is described in follows. Firstly is necessary have installed the packages mentioned above, that ought to be downloaded and installed. You ought to be located in a terminal within a directory that you selected to install NS2, with root privileges. For our simulation were selected *home/dulce/* directory. The steps are the follows:

1. Starting the operating system Ubuntu 9.04 and located in your selected directory to install NS2, write:

```
# sudo apt-get install build-essential autoconf automake libxmu-dev
  //to install the packages required
# wget
  http://sourceforge.net/project/downloading.php?group_id=149743&filename=ns_alli
  none&filename=ns_allinone-2.33.tar.gz&a=6853718
# tar –xvzf ns-allione-2.33.tar.gz
# cd ns-allinone-2.33
# ./install
```

2. For set environment variables, open the ~/.bashrc file with text editor *gedit* and write the instruction show in the Table A.1. After save the file, and continuous with the source instruction in the command line.

Table A.1 Additions for .bashrc path enviroment.

Note: You ought to change the */home/dulce/* by the path where you have installed NS2
LD_LIBRARY_PATH OTCL_LIB=/home/dulce/ns-allinone-2.33/otcl-1.13 NS2_LIB=/home/dulce/ns-allinone-2.33/lib X11_LIB=/usr/X11R6/lib USR_LOCAL_LIB=/usr/local/lib export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$OTCL_LIB:$NS2_LIB:$X11_LIB:$USR_LOCAL_LIB # TCL_LIBRARY TCL_LIB=/home/dulce/ns-allinone-2.33/tcl8.4.18/library USR_LIB=/usr/lib export TCL_LIBRARY=$TCL_LIB:$USR_LIB # PATH XGRAPH=/home/dulce/ns-allinone-2.33/bin:/home/dulce/ns-allinone-2.33/tcl8.4.18/unix:/home/dulce/ns-allinone-2.33/tk8.4.18/unix NS=/home/dulce/ns-allinone-2.33/ns-2.33/ NAM=/home/dulce/ns-allinone-2.33/nam-1.13/ export PATH=$PATH:$XGRAPH:$NS:$NAM

```
# gedit ~/.bashrc
# source ~/.bashrc
// To verify that ns was correctly installed, put ns and then the prompt ought to show a
% symbol. When get % please put "exit" to go out of ns.
# ns
% exit
```

3. At this point you have NS2 correctly installed, but *nam* not run without an addition of 3 code lines in *tkBind.h* file and one patch for gcc in *tk8.4.18/generic/tk.h* file. To modify the *tkBind.h* file located in *tk8.4.18/generic/* directory you ought to addition in the line 589 the three code lines showed in Table A.2 with '+' at principle of the line, save the file and continue.

```
# cd tk8.4.18/generic/
# gedit tkBind.h
// Add the three code lines `+' in the position indicated of the Table A.2 and save.
# cd ..
```

4. Also is necessary to prepare the patch called *tk8.4lastevent.patch* in directory *tk8.4.18.* For create the patch set the instructions which are showed in the Table A.3 and save. The instructions were extracted from http://bugs.gentoo.org/show_bug.cgi?id=225999 and are detailed in follow.

Table A.2 Instructions for modify the tkBind.cc file.

```
--- tk8.4.18-orig/generic/tkBind.c    2006-07-21 08:26:54.000000000 +0200
+++ tk8.4.18/generic/tkBind.c         2008-07-05 12:17:10.000000000 +0200
@@ -586,6 +586,9 @@
    /* ColormapNotify */              COLORMAP,
    /* ClientMessage */               0,
    /* MappingNotify */               0,
+#ifdef GenericEvent
+   /* GenericEvent */        0,
+#endif
    /* VirtualEvent */                VIRTUAL,
    /* Activate */                    ACTIVATE,
    /* Deactivate */                  ACTIVATE,
```

```
# gedit tk8.4lastevent.patch
// Set the instructions of Table A.3, save the file and exit of gedit.
# patch –p1 < ./ tk8.4lastevent.patch
File to patch: generic/tk.h
```

Table A.3 Instructions for tk8.4lastevent.patch.

```
--- generic/tk.h.orig          2008-02-06 16:31:40.000000000 +0100
+++ generic/tk.h               2008-07-24 08:21:46.000000000 +0200
@@ -635,17 +635,15 @@
 *
 *----------------------------------------------------------------------
 */
-#define VirtualEvent          (LASTEvent)
-#define ActivateNotify        (LASTEvent + 1)
-#define DeactivateNotify      (LASTEvent + 2)
-#define MouseWheelEvent       (LASTEvent + 3)
-#define TK_LASTEVENT          (LASTEvent + 4)
+#define VirtualEvent          (MappingNotify + 1)
+#define ActivateNotify        (MappingNotify + 2)
+#define DeactivateNotify      (MappingNotify + 3)
+#define MouseWheelEvent       (MappingNotify + 4)
+#define TK_LASTEVENT          (MappingNotify + 5)

 #define MouseWheelMask              (1L << 28)
-
 #define ActivateMask          (1L << 29)
 #define VirtualEventMask      (1L << 30)
-#define TK_LASTEVENT          (LASTEvent + 4)
 /*
```

5. Now you ought to compile NS2 for attach the change made to the code.

```
# cd ..
# ./install
```

6. At this moment you have installed NS 2.33 over Ubuntu 9.04 and *nam* ready to run. Not forget that in this section the objective is show the reproduction of environment to work with SIP Module by Rui Prior. The SIP Module that is in official page is to version 2.27 of NS2 therefore is necessary prepare other patch making some light changes manually, first download the module (review that are in the *ns-allinone-2.33* directory), unzip it, open the patch downloaded with *gedit* and replacement all 2.27 by 2.33, save the file and install the patch by mean the next instructions:

```
# wget http://www.dcc.fc.up.pt/~rprior/ns/ns-allinone-2.27-sip-v1_11.patch
# gedit ns-allinone-2.27-sip-v1_11.patch
      //replace the 2.27 by 2.33 and save like "ns-allinone-2.33-sip-v1.11.patch".
# patch –p1 < ns-allinone-2.33-sip-v1_11.patch
      //If the terminal show a message with some changes without success is necessary
      to do manually these changes in each file. After is possible continue and compiled
      once more.
# ./install
# cd ns-2.33/
# make
# ./validate
   //The validate can take several minutes.
```

7. It is the end of the instructions. The environment needed to start with SIP Module of Rui Prior and NS 2.33 on Linux Ubuntu 9.04 is ready. To verify that the *ns* were correctly installed, put *ns* and then the prompt ought to show a % symbol. And when you set *nam* then ought to appear the window of Network Animator.

```
# ns
% exit
# nam
// window of network animator
```

8. Enjoy!

A.3 NS2 all-in-one under Suse 11.1

Linux Suse 11.1 provides two environments desktop *K Desktop Environment* (KDE) and *GNU Network Object Model Environment* (GNOME), is recommendable use GNOME because the patch showed in this appendix for the network animator of NS2 only function for this environment.

Remember that is necessary install additional packages. These packages ought to be downloaded and installed since the tool YaST of Suse 11.1. The procedure steps are presented the follows:

1. Starting the operating system Suse 11.1 follow the next path: *System, YaST, Software, Install/Unistall programs* and then seek and install the follow packages: *autoconf, automake, autogen, libX11-devel, gcc & c++ compiler*.
2. In a terminal with root privileges set in the indicated order the next instructions at directory where is desired to install NS2:

```
# wget
http://sourceforge.net/project/downloading.php?group_id=149743&filename=ns_alli
none&filename=ns_allinone-2.33.tar.gz&a=6853718
# tar –xvzf ns-allione-2.33.tar.gz
# cd ns-allinone-2.33
# ./install
```

3. For set environment variables, follow the instructions for edit the file ~/.bashrc and write the code showed in Table A.1, and save the file. Continuous with the *source* instruction.

```
# gedit ~/.bashrc
//at this point, write the instructions showing at Table A.1 where the installation of NS
2.33 was located in home/dulce directory.
# source ~/.bashrc
```

4. At this point you have NS2 installed, but *nam* not run without an addition of one patch for gcc in *tk8.4.18/generic/tk.h* file. So that is necessary to prepare the patch called *tk8.4lastevent.patch* in directory *tk8.4.18.* For create the patch set the instructions which are showed in the Table A.3 and save. The instructions for generate the patch were extracted from http://wirelesscafe.wordpress.com/2008/12/23/how-to-install-ns2-on-fedora-10-cambridge/

```
# cd tk8.4.18
# gedit tk8.4lastevent.patch
// Set the instructions of Table A.3, save the file and exit of gedit.
# patch –p1 < ./ tk8.4lastevent.patch
```

```
File to patch: generic/tk.h
```

9. Now you ought to compile NS2 for attach the change made to the code.

```
# cd ..
# ./install
```

10. At this moment you have installed NS 2.33 over Ubuntu 9.04 and *nam* ready to run. Not forget that in this section the objective is show the reproduction of environment to work with SIP Module by Rui Prior. The SIP Module that is in official page is to version 2.27 of NS2 therefore is necessary prepare other patch making some light changes manually, first download the module (review that are in the *ns-allinone-2.33* directory), unzip it, open the patch downloaded with *gedit* and replacement all 2.27 by 2.33, save the file and install the patch by mean the next instructions:

```
# wget http://www.dcc.fc.up.pt/~rprior/ns/ns-allinone-2.27-sip-v1_11.patch
# gedit ns-allinone-2.27-sip-v1_11.patch
      //replace the 2.27 by 2.33 and save like "ns-allinone-2.33-sip-v1.11.patch".
# patch –p1 < ns-allinone-2.33-sip-v1_11.patch
      //If the terminal show a message with some changes without success is necessary
      to do manually these changes in each file. After is possible continue and compiled
      once more.
# ./install
# cd ns-2.33/
# make
# ./validate
   //The validate can take several minutes.
```

11. It is the end of the instructions. The environment needed to start with SIP Module of Rui Prior and NS 2.33 on Linux Ubuntu 9.04 is ready. To verify that the *ns* were correctly installed, put *ns* and then the prompt ought to show a % symbol. And when you set *nam* then ought to appear the window of Network Animator.

```
# ns
% exit
# nam
// window of network animator
```

12. Enjoy!

Like was mentioned in this appendix the principal modules used in our simulations were the WLAN 802.11 and SIP modules, therefore in the appendix B is showed a brief description of these modules and the changes made to achieve a 802.11b like as GPRS behavior where also is described the modifications made for authentication in the SIP Module.

Details over installation of NS2 and Linux Fedora distribution can be founded at page http://wirelesscafe.word press.com/2008/12/23/how-to-install-ns2-on-fedora-10-cambridge/

Appendix B

ENABLING ROAMING WITH SIP

NS2 provides a large number of built in C++ objects. It is advisable to use these C++ objects to set up a simulation using a *Tool common language* (Tcl) simulation script. Sometimes, these objects are insufficient, therefore is needed to develop our own C++ objects, and use an OTcl configuration interface to put together these objects in simulation modules. Incorporating these modules into NS2 requires profound understanding of NS2 architecture, to achieve it is recommendable consult the book wrote by Issariyakul and Hossain [49] because, the online tutorials reviewed only include basic information for begin to use a NS2 and wireless networks and the formal documentation of NS2 is mainly written as a reference book [50], and not provide much information for beginners.

The 802.11 MAC protocol was one of the features in the project Rice Monarch (Mobile Networking Architectures) which provide substantial extensions to NS2, since NS2 2.26 version the 802.11 module has been built in NS2 and ported from Monarch Project by University of California. NS-2 802.11 module includes C++ implementations (Mac802 11Class) and related TCL implementations. In our simulation, data rate of the 802.11 module has been changed to 11Mbps to simulate 802.11b standard and for 802.11b WLAN environment, this module is used along with the wireless channel implementation and two-ray ground propagation model over wireless physical module of NS2. For the GPRS environment at principle was pretended use a GPRS Module designed for Eurane but was not possible because it not permit the use of hierarchical addressing (which are used in 802.11 and SIP modules). But this was not a problem ought to through the *Gateway GGSN* (GGSN) which acts as the interface to public data networks (like the Internet and contains the routing information to be used to tunnel packets), we could have communication with the GPRS network and IMS.

SIP module [52] is a contribution designed by Rui Prior of the Porto University with implemented the basics of signaling SIP without take in account the SDP. NS-2 SIP module includes C++ implementations (SIP Class) and related TCL implementations. When we install the patch of the module (modify like was described in Appendix A), it set in directory *ns-allinone-2.33/ns-2.33/tcl/lib/* the file *ns-sip.tcl* and set in the directory *ns-allinone-2.33/ns-2.33/sip/* the files listed in the Table B.1. In addition, the patch modify the file *Makefile.in*.

Table B.1 Files in original SIP Module.

HEADER FILE	CC FILE
sip-body.h	*sip-body.cc*
sip.h	*sip.cc*
sip-message.h	*sip-message.cc*
sip-proxy.h	*sip-proxy.cc*
sip-timers.h	*sip-timers.cc*
sip-trans.h	*sip-trans.cc*
sip-tu.h	*sip-tu.cc*
sip-ua.h	*sip-ua.cc*

We built two models the Cooperative and the Brokered but due to their characteristics we needed modify the original files of SIP Module in two forms, each form installed in different machines. The files for two models listed in the Table B.2 have the same modifications to the original SIP module code. For Brokered Model we had marked with * the files that have additional modifications due to the addition of the broker entity, moreover we built and add new files, the *sip-rb.h* and *sip-rb.cc*, therefore was necessary modified the *Makefile.in*.

Table B.2 Files modified and added in the analyzed methods.

COOPERATIVE		BROKERED	
header file	**cc file**	**header file**	**cc file**
sip-tu.h	sip.cc	sip-tu.h	sip.cc
sip-proxy.h	sip-tu.cc	sip-proxy.h	sip-tu.cc
sip.h	sip-body.cc	*sip.h	sip-proxy.cc
sip-ua.h	sip-proxy.cc	*sip-ua.h	sip-trans.cc
sip-message.h	sip-trans.cc	*sip-message.h	sip-body.cc
	sip-message.cc		*sip-message.cc
		sip-rb.h	***sip-rb.cc****
ns-sip.tcl		ns-sip.tcl Makefile.in	

Our contribution for the SIP_REGISTER and SIP_INVITE messages were implemented essentially in the *sip-message.cc* and *sip-message.h* files, where we added a method for authentication and authorization based on [8] where detail a basic and digest access authentication for both methods.

B.1 sip-rb.h and sip-rb.cc file

The Figure B.1 showed the sip-rb.h file and B.2 showed the sip-rb.cc file with the code that buil the broker entity like as part of our contribution to the SIP Module in NS2.

```
/*Author: Dulce Rosas*/
/* Header file for SIP Roaming Broker Agent*/
/*5 de agosto de 2009*/
/*sip-rb.h*/

#ifndef ns_sip_ua_h
#define ns_sip_ua_h

#include "agent.h"
#include "tclcl.h"
#include "packet.h"
#include "address.h"
#include "ip.h"
#include "sip.h"
#include "sip-trans.h"
#include "sip-tu.h"

struct RegEntry {
  RegEntry(SIPURI *r, SIPURI *t) : reg(*r), target(*t) { }
  SIPURI reg;
  SIPURI target;
  double expires;   // Not used yet: registrations, like diamonds, are forever
};

class SIPRB : public SIPTU {
public:
  SIPRB(const char *domain);
  ~SIPRB();
  int command(int argc, const char*const* argv);
  virtual void transportSend(Packet *p);
  virtual int send100() { return send100_; }   // Yes if so configured
protected:
  virtual void informTU(enum SIPTlEvents ste, SIPTransaction *st);
  void timerCexpired(SIPTransaction *st);
  virtual void fromTransport(Packet *p);
  virtual void processRequest(Packet *p, SIPTransaction *st);
  virtual void processResponse(Packet *p);
  virtual void forwardResponse(Packet *p);
  void procReqHdrs4Fw(SIPMessage *sm, int pr);
  RegEntry *matchReg(const char *user, const char *domain);
  virtual void condFillIPHeaders(Packet *p);  // May remove ROUTE header!
  void cancel(CltINVITETrans *cit);
  list<RegEntry *> regDB;
  int recordRoute_;
  int send100_;
private:
  SIPRB();
};

#endif /* ns_sip_ua_h */
```

Figure B.1 sip-rb.h file for Brokered Model.

```
/*Author: Dulce Rosas*/
/* C++ file for SIP Roaming Broker Agent*/
/*5 de agosto de 2009*/
/*sip-rb.cc*/

#include <iostream>
using namespace std;
#include "address.h"
#include "sip-rb.h"

#include <list>

static class SIPRBClass : public TclClass {
public:

  SIPRBClass() : TclClass("Agent/SIPRB") {}

  TclObject* create(int argc, const char*const* argv) {
    if (argc != 5) { // 1 additional arg
      cout << "ERROR: Agent/SIPRB takes 1 argument" << endl;
      exit(1);
    }
    return (new SIPRB(argv[4]));
  }
} class_SIPRB;

int SIPRB::command(int argc, const char*const* argv) {
  // Default
  return SIPTU::command(argc, argv);
}


// Receive a transaction layer event notification

void SIPRB::informTU(enum SIPTlEvents ste, SIPTransaction *st) {
  switch (ste) {
    case STE_TMR_B_EXP: // Timer B expired
      cout << "Warning: Timer B expired (proxy)" << endl;
      // TODO: Check out if there is anything else to do here
      break;
    case STE_TMR_C_EXP: // Timer C expired
      timerCexpired(st);
      break;
    case STE_TMR_F_EXP: // Timer F expired
      cout << "Warning: Timer F expired (proxy)" << endl;
      // TODO: Check out if there is anything else to do here
      break;
    case STE_TMR_H_EXP: // Timer H expired
      cout << "Warning: Timer H expired (proxy)" << endl;
      // TODO: Check out if there is anything else to do here
      break;
    default:
      cout << "ERROR: unknown event in SIPRB::informTU()" << endl;
      exit(0);
  }
}


// Receive directly from transport a message that matched no transaction

void SIPRB::fromTransport(Packet *p) {
  //cout << "SIPRB::fromTransport()" << endl;
  SIPMessage *sm = (SIPMessage *) p->userdata();
  if (sm->msgType() == SIP_REQUEST) {
    processRequest(p, NULL);
```

```
   } else {
      // Just forward the response
      sm->delFirst(SH_VIA);
      initpkt(p); // Does not remove AppData :-)
      transportSend(p);
   }
}

void SIPRB::processRequest(Packet *p, SIPTransaction *st) {
   //cout << "SIPRB::processRequest()" << endl;
   SIPMessage *sm = (SIPMessage *) p->userdata();

   // check that message is for RB
   if ((!sm->req().uri.withAddr() &&
         !strcmp(sm->req().uri.domain, MySIPAddr.domain)) ||
         (sm->req().uri.withAddr() && sm->req().uri.addr == addr())) {
      // The packet is for me
      //cout << "  withAddr = " << sm->req().uri.withAddr() << "\n  sm->req().uri.domain = " << sm->req().uri.domain << "\n
MySIPAddr.domain = " << MySIPAddr.domain << "\n  sm->req().uri.addr = " << sm->req().uri.addr << "\n  addr() = " << addr() << endl;
      //RB extracts the VN identifier and the SLA-related information to perform a look up in the reputation list.

      SIPHeaderVnID *shvnid = (SIPHeaderVnID *) sm->firstHeader(SH_VNID);

      // If the VN has an acceptable SLA reputation and the network statistics fulfill the SLA requirements,

      // strip off VN info
      sm->delHeader(shvnid);

      // Update URI
      procReqHdrs4Fw(sm, !sm->req().uri.withAddr());
      initpkt(p); // Does not remove AppData :-)
      if (sm->reqMethod() == SM_INVITE) {
         // Associate the clt transaction with the srv transaction
         SIPHeaderVia *myvia = (SIPHeaderVia*) sm->firstHeader(SH_VIA);
         ((SrvINVITETrans *) st)->fwBranch() = myvia->branch_;
      }
      toTrans(p);

   }
}


// Process request headers for forwarding
// The partial resolve (pr) parameter is used to drop home proxies out of
// the signaling path when roaming if recordRoute_ == RR_NOHOME (2)

void SIPRB::procReqHdrs4Fw(SIPMessage *sm, int pr) {
   // Eventually add Record-Route header
   if (recordRoute_ == 1) {
      if (sm->reqMethod() != SM_REGISTER) {
         sm->addHeaderTop(new SIPHeaderRecordRoute(addr()));
      }
   } else if (recordRoute_ == 2) {
      if (sm->reqMethod() != SM_REGISTER && !pr) {
         sm->addHeaderTop(new SIPHeaderRecordRoute(addr()));
      }
   }
   // Remove first Route header if it points to me
   SIPHeaderRoute *shr = (SIPHeaderRoute *) sm->firstHeader(SH_ROUTE);
   if (shr != NULL && shr->node_ == addr()) {
      sm->delHeader(shr);
   }

   // Add Via header
   sm->addHeaderTop(new SIPHeaderVia(addr(), newBranch()));
}
```

```
void SIPRB::processResponse(Packet * p) {
   // TODO: Process 3xx-6xx responses, etc. (sec. 16.7)
   //cout << "SIPRB::processResponse() at " << addr() << endl;
   SIPMessage *sm = (SIPMessage *) p->userdata();
   sm->delFirst(SH_VIA);
   if (sm->firstHeader(SH_VIA) != NULL) { // Not for me
      forwardResponse(p);
   } else {
      SIPHeaderCSeq *shcs = (SIPHeaderCSeq *) sm->firstHeader(SH_CSEQ);
      if ((shcs->method_ != SM_CANCEL) || (shcs->method_ != SM_PROXYCHAL)) {
         cout << "ERROR: Proxies only generate CANCEL requests" << endl;
      }
      freeSIPPkt(p);
   }
}

void SIPRB::forwardResponse(Packet * p) {
   SIPTransaction *st = tl_->matchSrvTrans(p);
   if (st == NULL) {
      cout << "No transaction found to forward response!!!" << endl;
      // Send it statelessly
      initpkt(p); // Does not remove AppData :-)
      transportSend(p);
   } else {
      initpkt(p); // Does not remove AppData :-)
      st->fromTU(p);
   }
}

RegEntry * SIPRB::matchReg(const char *user, const char *domain) {
   list<RegEntry *>::iterator i;
   RegEntry *re = NULL;
   for (i = regDB.begin(); i != regDB.end(); i++) {
      // TODO: Remove expired ones
      re = (*i);
      if (!strcmp(re->reg.user, user) && !strcmp(re->reg.domain, domain)) {
         return re;
      }
   }
   return NULL;
}

// IMPORTANT: May remove ROUTE header, so cannot be called more than once.

void SIPRB::condFillIPHeaders(Packet * p) {
   // TODO: Perhaps this should be done in the TU before passing to the
   //       transaction layer for performance...
   // TODO: Change the setting of port to always 0
   hdr_ip *iph = hdr_ip::access(p);
   if (iph->daddr() == -1) { // Not initialized by upper layers
      Tcl& tcl = Tcl::instance();
      SIPMessage *sm = (SIPMessage *) p->userdata();
      bool request = (sm->msgType() == SIP_REQUEST);
      if (request) {
         SIPHeaderRoute *shr;
         if ((shr = (SIPHeaderRoute *) sm->firstHeader(SH_ROUTE)) != NULL) {
            iph->daddr() = shr->node_;
            sm->delHeader(shr);
         } else if (sm->req().uri.withAddr()) {
            iph->daddr() = sm->req().uri.addr;
         } else {
            // TODO: This always goes to the proxy, should not be this way
            // TODO: This uses DNSGod -- change it
            tcl.evalf("DNSGod resolve proxy %s", sm->req().uri.domain);
            if (tcl.result()[0] == '\0') {
               p->setdata(NULL);
               Packet::free(p);
```

```
            // TODO: How to handle this?
            cout << "ERROR: Proxy not found for domain " << sm->req().uri.domain << endl;
          } else {
            iph->daddr() = Address::instance().str2addr(tcl.result());
          }
        }
      } else {
        SIPHeaderVia *shv = (SIPHeaderVia *) sm->firstHeader(SH_VIA);
        iph->daddr() = shv->node_;
      }
      iph->dport() = 0;
    }
}

void SIPRB::transportSend(Packet * p) {
    condFillIPHeaders(p);
    send(p, 0);
}

void SIPRB::cancel(CltINVITETrans * cit) {
    SIPMessage *ism = (SIPMessage *) cit->lastPktSent()->userdata();
    Packet *p = allocpkt();
    // Build CANCEL message
    SIPMessage *nsm = new SIPMessage(SIP_REQUEST);
    nsm->req().method = SM_CANCEL;
    nsm->req().uri = ism->req().uri;
    nsm->addHeaderBottom(new SIPHeaderCSeq(((SIPHeaderCSeq *) ism->firstHeader(SH_CSEQ))->seqNo_, SM_CANCEL));
    nsm->addHeaderBottom(((SIPHeaderVia *) ism->firstHeader(SH_VIA))->copy());
    SIPHeader *sh = ism->firstHeader();
    while (sh != NULL) {
      switch (sh->type()) {
        case SH_TO:
        case SH_FROM:
        case SH_CALLID:
        case SH_ROUTE:
          nsm->addHeaderBottom(sh->copy());
          break;
      }
      sh = ism->nextHeader(sh);
    }
    // Add the message to the packet
    p->setdata(nsm);
    // Send the packet to the transaction layer
    toTrans(p);
}

void SIPRB::timerCexpired(SIPTransaction * st) {
    cout << "TODO: implement SIPRB::timerCexpired()" << endl;
    // TODO: cancel client transaction, send final response on server transaction
    //       See RFC-3261, sec. 16.8
    //       Do not forget resource reservations, if applicable
    //exit(0);
    //
    //
    // - Check the state of the client INVITE transaction
    //   - If CALLING (no 1xx received) behave as if a 408 had been received
    //     - Terminate the CIT
    //     - Find the corresponding SIT and send back a 408
    //     - If at the caller side, send a DRS to the QoS Broker
    //   - Otherwise send a CANCEL request
    //     - Terminate the CIT ???
    //       => Problem when the 487 comes back
    //          => Unless it is forwarded statelessly... Check it out!
    //     - Do NOT send anything back
    //     - Send a DRS to the QoS Broker(s)
}
```

```
SIPRB::SIPRB(const char *domain) : SIPTU(TU_PROXY) {
   bind_bool("recordRoute_", &recordRoute_);
   bind_bool("send100_", &send100_);
#ifdef SIPTU_PROC_DELAY
   bind("sipdelay_", &sipdelay_);
   bind("sdpdelay_", &sdpdelay_);
#endif // SIPTU_PROC_DELAY
   MySIPAddr.set("", domain);
   size_ = 500; // TODO: fix the size!!!
}

SIPRB::~SIPRB() {
   // TODO: check that all deallocation is being performed
}
```

Figure B.2 sip-rb.cc file for Brokered Model.

Appendix C

SCRIPTS TCL & AWK

This appendix was divided in two parts where each part corresponde to the two models studied. Firstly is showed an example of the basic simulation tcl script used. Then, following the process illustrated in the Figure C.1, we present an item of the files generated in this process. We generated four hundred and eighty tcl scipts; two hundred and twenty for every one model; for all the sceneries we had twenty tcl scripts vary only for the seed random position. Therefore we obtain the same cantity of simulation trace files (too showed above), which were analyzed to achieve the results showed in chapter sixth of this thesis. Also we show the four awk files (two files by model) that interpret these trace files to get the necessaries parameters for our analysis. In the following is showed the process that follow the scripts tcl in either model to get a file .dul

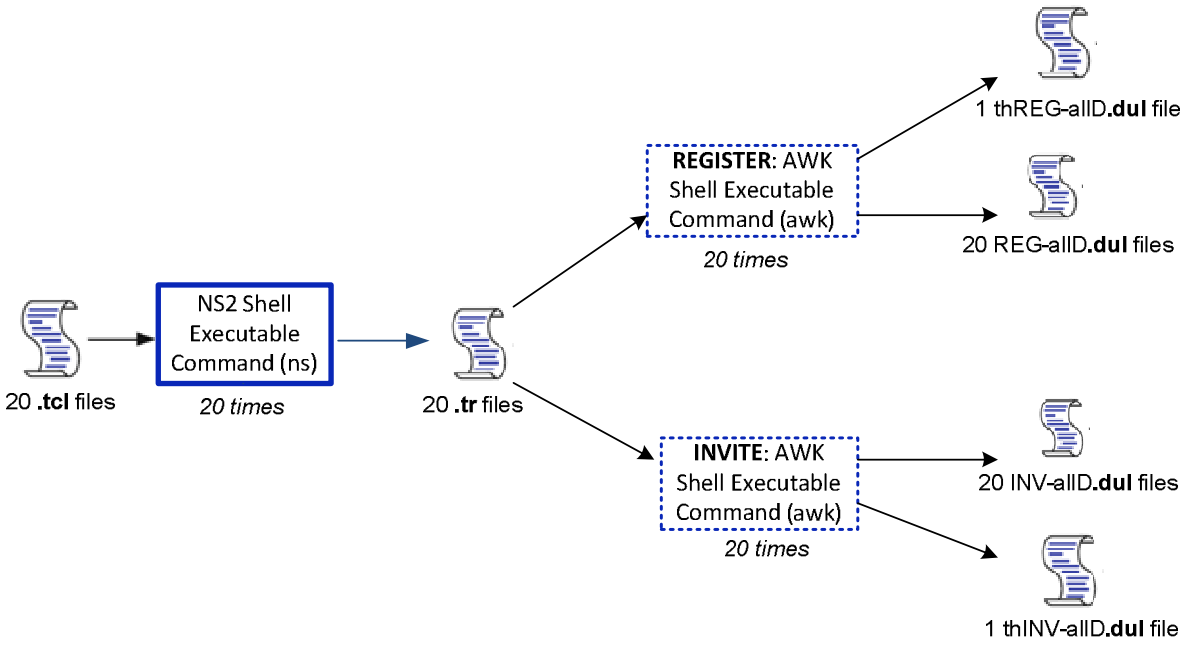

Figure C.1 Scripts process for each scenario in our study.

A tcl script selected in each model correspond to a scenario 8 where we have 10 MN moved at 10m/s with a random seed value for position of 110. In addition is showed the trace file generated; and the *awk* files applied to it and the other nineteen trace files to get a *thINV-allD.dul* file.

C.1 Roaming SIP in Cooperative Model

C.1.1 Script tcl

The Figure C.2 shows the script code for roaming SIP in Cooperative Model.

```
# ======================================================================
#ROAMING SIP IN COOPERATIVE MODEL
 ##Author: Dulce Selene Rosas Mendieta
# Date : 05/agosto/2009
#File name: SipnoRB.tcl
#
# ======================================================================
# Define options
# ======================================================================

set val(numMsnodes)              10                  ;# number of mobilenodes
set val(vel)                     10                  ;# speed of MH
set val(seedpos)                 110                 ;# seed position

set val(chan)   Channel/WirelessChannel              ;# channel type
set val(prop)   Propagation/TwoRayGround             ;# radio-propagation model
set val(netif)  Phy/WirelessPhy                      ;# network interface type
set val(mac)    Mac/802_11                           ;# MAC type
set val(ifq)    Queue/DropTail/PriQueue              ;# interface queue type
set val(ll)     LL                                   ;# link layer type
set val(ant)    Antenna/OmniAntenna                  ;# antenna model
set val(ifqlen)        50                            ;# max packet in ifq
set val(adhocRouting)   DSDV                         ;# routing protocol

set val(dHN)          0.01                            ;# Transmission delay among the GGSN, the IMS, and the SIPAAA
set val(di)           0.20                            ;# Internet delay based on Banerjee--elseiver200
set val(SIPPckS)       587                            ;# SIP packet size
set val(VNBW)          11000000                       ;# VN Internet Bandwidth pudiera ser 2M
set val(RBBW)          20000000                       # RB Internet Bandwidth
set val(VoIPCODEC)     13.300                          ;# VoIP codec kbps

set val(x)     800.0                                   ;# x coordinate of topology
set val(y)     400.0                                   ;# y coordinate of topology

set val(xhnbs)  200.0                                ;# x coordinate of center HN Basestation
set val(yhnbs)  200.0                                ;# y coordinate of center HN Basestation

set val(xvnbs)  500.0                                ;# x coordinate of center VN Basestation
set val(yvnbs)  200.0                                ;# y coordinate of center VN Basestation

set val(simseed)                 101                 ;# Seed value
set val(arrvavg)                 10                  ;# Average interarrival time
set val(SimStopTime)             600                 ;# Simulation Time


# ======================================================================
# Main Program
# ======================================================================

# create simulator instance
set ns_   [new Simulator]

# set up for hierarchical routing
$ns_ node-config -addressType hierarchical
AddrParams set domain_num_ 3                          ;# number of domains
lappend cluster_num 1 1 1                            ;# number of clusters in each domain
AddrParams set cluster_num_ $cluster_num
lappend eilastlevel 2 [expr [expr 2*$val(numMsnodes)] + 1] [expr $val(numMsnodes) + 1] ;# number of nodes in each cluster
AddrParams set nodes_num_ $eilastlevel ;# of each domain
```

```
#Trace Information
set tracefd  [open WNSipnoRB-out.tr w]
set namtrace [open WNSipnoRB-allout.nam w]

#$ns_ use-newtrace
$ns_ trace-all $tracefd
$ns_ namtrace-all $namtrace

# Create topography object
set topo   [new Topography]
# define topology
$topo load_flatgrid $val(x) $val(y)
# create God
create-god [expr $val(numMsnodes) + 1]
# Table of colors
$ns_ color 0 blue
$ns_ color 1 green
$ns_ color 2 gold
$ns_ color 3 red

# Create IMS, GGSN, AAA
set GGSN [$ns_ node 0.0.0]
$GGSN set X_ [expr $val(xhnbs) - 50.00]
$GGSN set Y_ $val(yhnbs)
$GGSN set Z_ 0.00
$GGSN color red
$GGSN shape box


set AAA [$ns_ node 0.0.1]
$AAA set X_ [expr $val(xhnbs) - 75.00]
$AAA set Y_  $val(yhnbs); #[expr $val(yhnbs) - 50.00]
$AAA set Z_ 0.00
$AAA color orange
$AAA shape box

set IMS [$ns_ node 2.0.0]
$IMS set X_ [expr $val(xhnbs) - 50.00]
$IMS set Y_ [expr $val(yhnbs) + 100.00]
$IMS set Z_ 0.00
$IMS shape box

# SIP UAs attached to IMS
for {set i 0} {$i < $val(numMsnodes)} {incr i} {
            set W($i) [$ns_ node 2.0.[expr $i + 1]]
            puts "IMS UA($i) created"

            # set position of Ws
            $W($i) set X_ [expr $val(xhnbs) - 240 + [expr $i + 21]]
            $W($i) set Y_ [expr $val(yhnbs) + 120.00 *$i]
            $W($i) set Z_ 0.00
            $W($i) color green

            # set link
            $ns_ duplex-link $iMS $W($i) 100Mb 10ms DropTail
            #$ns_ duplex-link-op $iMS $W($i) color "white"
}

##################################################
# Configure WLAN Access Point #
##################################################
#-------------------------------------------------------------------
$ns_ node-config -adhocRouting $val(adhocRouting) \
            -llType $val(ll) \
            -macType $val(mac) \
            -ifqType $val(ifq) \
```

```
            -ifqLen $val(ifqlen) \
            -antType $val(ant) \
            -propType $val(prop) \
            -phyType $val(netif) \
            -channelType $val(chan) \
            -topoInstance $topo \
            -wiredRouting ON \
            -agentTrace ON \
            -routerTrace OFF \
            -macTrace OFF
#-------------------------------------------------------------

# Create VN Access Point
set VNBS [$ns_ node 1.0.0]
$VNBS random-motion 0
puts "Base-Station node VN created"

# Position (fixed) for base-station node (VNBS).
$VNBS set X_ $val(xvnbs)
$VNBS set Y_ $val(yvnbs)
$VNBS set Z_ 0.00
$VNBS radius 250
$VNBS color blue
$VNBS shape hexagon

##-setup Mobilenodes VN----
$ns_ node-config -wiredRouting OFF

for {set i 0} {$i < [expr $val(numMsnodes) *2 ]} {incr i} {
            set MH($i) [$ns_ node 1.0.[expr $i + 1]]
            puts "Wireless node MH($i) created"
            $MH($i) base-station [AddrParams addr2id [$VNBS node-addr]] ;# provide each MH with hier-add in VNBS
            $MH($i) random-motion 0

            #Here random position initial &  mobility
            $defaultRNG seed [expr $val(seedpos) + $i]
            set posRNG1 [new RNG]
            set posX_ [new RandomVariable/Uniform]
            $posX_ set min_ -250
            $posX_ set max_ 250
            $posX_ use-rng $posRNG1

            $defaultRNG seed [expr $val(seedpos) - $i]
            set posRNG2 [new RNG]
            set posY_ [new RandomVariable/Uniform]
            $posY_ set min_ -250
            $posY_ set max_ 250
            $posY_ use-rng $posRNG2

            set tempX($i) [expr $val(xvnbs) + [$posX_ value]]
            set tempY($i) [expr $val(yhnbs) + [$posY_ value]]

            #set Initial positions with random
            $MH($i) set X_ $tempX($i);#$posX_ value
            $MH($i) set Y_ $tempY($i);# $posY_ value
            $MH($i) set Z_ 0.00
            #puts "$i x= $tempX($i)  y=$tempY($i)"
            #set the direction of movement (to VNBS)
            set MovTime($i) [expr [expr $i+1 ] * 5 + $val(numMsnodes)-1 ]
            $ns_ at $MoveTime($i) "$MH($i) setdest $val(xvnbs) $val(yvnbs) $val(vel)"
            $ns_ at $MoveTime($i) "$ns_ trace-annotate \"MH($i) initiate movement to VNBS\""
            #puts "at $MovTime($i)  MH($i) inicia mov to VNBS"
}

# create links between VN and HN
$ns_ duplex-link $VNBS $GGSN 11Mb 200ms DropTail
$ns_ duplex-link $GGSN $AAA 100Mb 10ms DropTail
```

```
$ns_ duplex-link $GGSN $IMS 100Mb 10ms DropTail

$ns_ duplex-link-op $VNBS $GGSN color "chocolate"
$ns_ duplex-link-op $VNBS $GGSN orient left
$ns_ duplex-link-op $GGSN $AAA color "yellow"
$ns_ duplex-link-op $GGSN $AAA orient left
$ns_ duplex-link-op $GGSN $IMS color "green"
$ns_ duplex-link-op $GGSN $IMS orient up

# Set Up SIP-Proxy servers, VN Proxy and HN Proxy
$VNBS label-color black
$VNBS label "AP proxy.vnet.com"
set serveraddrVN [$VNBS node-addr]
set sipVN [new Agent/SIPProxy vnet.com]
$ns_ attach-agent $VNBS $sipVN

$IMS label-color green
$IMS label "IMS proxy.homenet.com"
set serveraddrHN [$IMS node-addr]
set sipHN [new Agent/SIPProxy homenet.com]
$ns_ attach-agent $IMS $sipHN
$IMS set fid_ 0

# Processing delays
Agent/SIPUA set sipdelay_  0.000267;# esta para 11M para 2M seria 0.001493
Agent/SIPUA set sdpdelay_ 0.0
Agent/SIPProxy set sipdelay_ 0.201641   ; #esta para 11 p 2M ee igual: 0.201908
Agent/SIPProxy set sdpdelay_ 0.0

# Set up SIP-User agents Wireless
for {set i 0} {$i < $val(numMsnodes)} {incr i} {
        # User agents called Wireless Nodes
        $W($i) label-color black
        $W($i) label "bob$i@homenet.com"
        set sipbob($i) [new Agent/SIPUA bob$i homenet.com]
        $ns_ attach-agent $W($i) $sipbob($i)
        $W($i) set fid_ 2
        # Setup outbound proxies
        $sipbob($i) set-proxy $serveraddrHN
        # Configure receiving terminals for complex response, waiting between 1 and 3
        # seconds after ringing to pick up the phone
        $sipbob($i) set simple_ 0
        $sipbob($i) set minAnsDel_ 1.0
        $sipbob($i) set maxAnsDel_ 3.0
        # User agents calling Wireless Nodes
        $MH([expr $i *2]) label-color blue
        $MH([expr $i *2]) label "alice[expr $i *2]@vnet.com"
        set sipalice([expr $i *2]) [new Agent/SIPUA alice[expr $i *2] vnet.com]
        $ns_ attach-agent $MH([expr $i *2]) $sipalice([expr $i *2])
        $MH([expr $i *2]) set fid_ 3
        # Setup outbound proxies
        $sipalice([expr $i *2]) set-proxy $serveraddrVN
}

# Set Record-Route on proxies
$sipHN set recordRoute_ 1
$sipVN set recordRoute_ 2
#Register proxies with DNS "God"
DNSGod register proxy vnet.com $serveraddrVN
DNSGod register proxy homenet.com $serveraddrHN

#Set traffic pattern of VN nodes - Interarrivaltimes
$defaultRNG seed $val(simseed)
set arrivalRNG [new RNG]
#set sizeRNG [new RNG]
set arrival_ [new RandomVariable/Exponential]
$arrival_ set avg_ $val(arrvavg)
```

```
$arrival_ use-rng $arrivalRNG

#Registering in VN
#Set Movement pattern MH in VN only the middle are detected & registered
for {set i 0} {$i < $val(numMsnodes)} {incr i} {
        # Register nodes at HN home
        $ns_ at $i+1 "$ns_ trace-annotate \"Registering bob$i@homenet.com\""
        $ns_ at $i+1 "$sipbob($i) register"

        set RegTime [expr [expr $i + $val(numMsnodes)] * 10 + 5]; #each 10 sec
        set SesTime($i) [expr $RegTime + 5 + [$arrival_ value]]
        set ByeTime($i) [expr $SesTime($i) + 45]
        puts "MH([expr $i *2]) is in coverage area & registering in VNBS at [format "%-8.3f " $RegTime]"
        $ns_ at $RegTime "$ns_ trace-annotate \"Registering alice[expr $i *2]@vnet.com\""
        $ns_ at $RegTime "$sipalice([expr $i *2]) register"
        $ns_ at $RegTime "$MH([expr $i *2]) add-mark m1 blue circle"
}

# Iniviting to stablish sessions
for {set i 0} {$i < $val(numMsnodes)} {incr i} {
        puts "MH([expr $i *2]) initiates session at [format "%-8.3f " $SesTime($i)]"
        $ns_ at $SesTime($i) "$ns_ trace-annotate \"alice[expr $i *2]@vnet.com starts session to bob$i@homenet.com\""
        $ns_ at $SesTime($i) "$sipalice([expr $i *2]) invite bob$i homenet.com bw 13.3kb 13.3kb"
        $ns_ at $SesTime($i) "$MH([expr $i *2]) delete-mark m1"
        $ns_ at $SesTime($i) "$MH([expr $i *2]) add-mark m2 green hexagon"

}
# Finishing with bye sessions
for {set i 0} {$i < $val(numMsnodes)} {incr i} {
        $ns_ at $ByeTime($i) "$ns_ trace-annotate \"sipbob($i)@homenet.com say bye to sipalice([expr $i *2])@vnet.com (any side may
terminate the call)\""
        $ns_ at $ByeTime($i) "$sipbob($i) bye"
        $ns_ at $ByeTime($i) "$MH([expr $i *2]) delete-mark m2"
        $ns_ at $ByeTime($i) "$MH([expr $i *2]) add-mark m3 black"
        puts "MH([expr $i *2]) and W($i) bye session at [format "%-8.3f " $ByeTime($i)]"
}


set NewVel  [expr $val(vel)/4]
if {$val(vel) == 1} {
   set NewVel 2}

#Para movimientos despues de estar cerca de la BSVN
 for {set i 0} {$i < $val(numMsnodes)} {incr i} {
    puts "--------nodo $i"
        set distance sqrt([expr pow([expr $val(yvnbs)- $tempY($i)],2) + pow([expr $val(xhnbs)-$tempX($i)],2)])
        set tim [expr $distance/$val(vel)]
        set newMoveTime($i) [expr $MoveTime($i)+ $tim +[expr $val(numMsnodes)+$i] ]

         $ns_ at $newMoveTime($i) "$ns_ trace-annotate \"MH($i) initiate move to any place at new vel\""
         set temp $MH($i)
         #$ns_ at $newMovTime($i) start ;
        $ns_ at $newMoveTime($i) "$temp setdest $tempX($i) $tempY($i) $NewVel"
      puts "para ($i) = $newMoveTime($i) vel$NewVel"
        set t [expr $val(numMsnodes)- 1 ]
        if {$ByeTime($t) < $newMoveTime($i) } {
           break
        }
 }

#this for always position the last Num-5 nodes after arrives very near of the VNBS
 for {set j $val(numMsnodes)} { $j < [expr $val(numMsnodes) *2] } {incr j} {
         set distance sqrt([expr pow([expr $val(yvnbs)-$tempY($j)],2) + pow([expr $val(xhnbs)-$tempX($j)],2)])

         set newMoveTime($j) [expr $MoveTime($j)+ [expr $distance/$val(vel)] + [expr $val(numMsnodes)+1+$j]*2 ]
         $ns_ at  $newMoveTime($j) "$ns_ trace-annotate \"MH($j) initiate move to any place at new vel\""
#        $ns_ at $newMovTime($j) start ;# $ns_ at  $newMovTime($j) "$MH($j) setdest $tempX($j) $tempY($j) $NewVel"
```

```
# puts "new time mov of ($j) = $newMovTime($j)"
            set t [expr $val(numMsnodes)- 1 ]
            if {$ByeTime($t) < $newMoveTime($j) } {
               break
            }
}

# Some useful headers for tracefile
puts $tracefd "M 0.0 numMsnodes $val(numMsnodes) vel:$val(vel) x:$val(x) y: $val(y) rp:$val(adhocRouting)"
puts $tracefd "M 0.0 seed_interrarival:$val(simseed) seedPos:$val(seedpos)"
puts $tracefd "M 0.0 prop $val(prop) ant $val(ant)"
puts "Starting Simulation..."

#Define node initial position in nam, only for nam
for {set i 0} {$i < $val(numMsnodes) } {incr i} {
            # The function must be called after mobility model is defined.
            $ns_ initial_node_pos $MH($i) 7
}

#Put nodes in place again
$ns_ at 0.0 "$ns_ dump-namnodes"
# Tell all nodes when the simulation ends
for {set i 0} {$i < [expr 2*$val(numMsnodes)] } {incr i} {
            $ns_ at $val(SimStopTime).0 "$MH($i) reset"
}

#Simulation Stop Time & Close Files & run
$ns_ at $val(SimStopTime).0 "$VNBS reset";
$ns_ at $val(SimStopTime).0002 "puts \"NS EXITING...\" ; $ns_ halt"
$ns_ at $val(SimStopTime).0001 "stop"
proc stop {} {
            global ns_ tracefd namtrace nf
            close $tracefd
            close $namtrace
            close $nf
}

$ns_ run
```

Figure C.2 Tcl script for roaming SIP in Cooperative Model.

.tr trace file generated

After to run the script in the NS2 shell executable command *(ns SipnoRB.tcl),* we get trace information into the simulation trace files *WNSipnoRB-out.tr* and *WNSipnoRB-allout.nam* based on code of Figure C.2. For our study we take like base the *WNSipnoRB-out.tr* which is showed in the Figure C.3.

```
M 0.0 numMsnodes 10 vel:10 x:800.0 y: 400.0 rp:DSDV
M 0.0 seed_interrarival:101 seedPos:110
M 0.0 prop Propagation/TwoRayGround ant Antenna/OmniAntenna
v 0 eval {set sim_annotation {Registering bob0@homenet.com}}
+ 0 3 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 0
- 0 3 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 0
r 0.010024 3 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 0
+ 0.010024 2 3 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 1
- 0.010024 2 3 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 1
r 0.020044 2 3 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 1
+ 0.020311 3 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 2
```

```
- 0.020311 3 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 2
r 0.030335 3 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 2
+ 0.030335 2 3 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 3
- 0.030335 2 3 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 3
r 0.040355 2 3 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 3
v 1 eval {set sim annotation {Registering bob1@homenet.com}}
+ 1 4 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 12
- 1 4 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 12
r 1.010024 4 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 12
+ 1.010024 2 4 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 13
- 1.010024 2 4 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 13
r 1.020044 2 4 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 13
+ 1.020311 4 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 16
- 1.020311 4 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 16
r 1.030335 4 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 16
+ 1.030335 2 4 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 17
- 1.030335 2 4 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 17
r 1.040355 2 4 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 17
v 2 eval {set sim_annotation {Registering bob2@homenet.com}}
+ 2 5 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 29
- 2 5 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 29
r 2.010024 5 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 29
+ 2.010024 2 5 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 30
- 2.010024 2 5 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 30
r 2.020044 2 5 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 30
+ 2.020311 5 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 31
- 2.020311 5 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 31
r 2.030335 5 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 31
+ 2.030335 2 5 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 32
- 2.030335 2 5 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 32
r 2.040355 2 5 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 32
v 3 eval {set sim_annotation {Registering bob3@homenet.com}}
+ 3 6 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 33
- 3 6 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 33
r 3.010024 6 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 33
+ 3.010024 2 6 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 34
- 3.010024 2 6 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 34
r 3.020044 2 6 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 34
+ 3.020311 6 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 35
- 3.020311 6 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 35
r 3.030335 6 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 35
+ 3.030335 2 6 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 36
- 3.030335 2 6 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 36
r 3.040355 2 6 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 36
v 4 eval {set sim_annotation {Registering bob4@homenet.com}}
+ 4 7 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 37
- 4 7 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 37
r 4.010024 7 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 37
+ 4.010024 2 7 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 38
- 4.010024 2 7 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 38
r 4.020044 2 7 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 38
+ 4.020311 7 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 39
- 4.020311 7 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 39
r 4.030335 7 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 39
+ 4.030335 2 7 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 40
- 4.030335 2 7 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 40
r 4.040355 2 7 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 40
v 5 eval {set sim_annotation {Registering bob5@homenet.com}}
+ 5 8 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 41
- 5 8 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 41
r 5.010024 8 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 41
+ 5.010024 2 8 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 42
- 5.010024 2 8 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 42
r 5.020044 2 8 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 42
+ 5.020311 8 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 43
- 5.020311 8 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 43
r 5.030335 8 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 43
+ 5.030335 2 8 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 44
- 5.030335 2 8 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 44
r 5.040355 2 8 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 44
v 6 eval {set sim_annotation {Registering bob6@homenet.com}}
+ 6 9 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 45
- 6 9 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 45
r 6.010024 9 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 45
+ 6.010024 2 9 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 46
- 6.010024 2 9 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 46
r 6.020044 2 9 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 46
+ 6.020311 9 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 47
- 6.020311 9 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 47
r 6.030335 9 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 47
+ 6.030335 2 9 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 48
- 6.030335 2 9 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 48
r 6.040355 2 9 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 48
```

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v 7 eval {set sim_annotation {Registering bob7@homenet.com}}
+ 7 10 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 49
- 7 10 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 49
r 7.010024 10 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 49
+ 7.010024 2 10 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 50
- 7.010024 2 10 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 50
r 7.020044 2 10 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 50
+ 7.020311 10 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 51
- 7.020311 10 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 51
r 7.030335 10 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 51
+ 7.030335 2 10 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 52
- 7.030335 2 10 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 52
r 7.040355 2 10 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 52
v 8 eval {set sim annotation {Registering bob8@homenet.com}}
+ 8 11 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 53
- 8 11 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 53
r 8.010024 11 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 53
+ 8.010024 2 11 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 54
- 8.010024 2 11 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 54
r 8.020044 2 11 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 54
+ 8.020311 11 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 55
- 8.020311 11 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 55
r 8.030335 11 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 55
+ 8.030335 2 11 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 56
- 8.030335 2 11 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 56
r 8.040355 2 11 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 56
v 9 eval {set sim_annotation {Registering bob9@homenet.com}}
+ 9 12 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 57
- 9 12 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 57
r 9.010024 12 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 57
+ 9.010024 2 12 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 58
- 9.010024 2 12 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 58
r 9.020044 2 12 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 58
+ 9.020311 12 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 59
- 9.020311 12 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 59
r 9.030335 12 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 59
+ 9.030335 2 12 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 60
- 9.030335 2 12 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 60
r 9.040355 2 12 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 60
M 14.00000 4194305 (404.46, 104.46, 0.00), (500.00, 200.00), 10.00
v 14 eval {set sim annotation {MH(0) initiate movement to VNBS}}
M 19.00000 4194306 (487.68, 21.24, 0.00), (500.00, 200.00), 10.00
v 19 eval {set sim annotation {MH(1) initiate movement to VNBS}}
M 24.00000 4194307 (570.90, 438.01, 0.00), (500.00, 200.00), 10.00
v 24 eval {set sim_annotation {MH(2) initiate movement to VNBS}}
M 29.00000 4194308 (654.13, 354.79, 0.00), (500.00, 200.00), 10.00
v 29 eval {set sim_annotation {MH(3) initiate movement to VNBS}}
M 34.00000 4194309 (737.35, 271.57, 0.00), (500.00, 200.00), 10.00
v 34 eval {set sim_annotation {MH(4) initiate movement to VNBS}}
M 39.00000 4194310 (320.57, 188.35, 0.00), (500.00, 200.00), 10.00
v 39 eval {set sim_annotation {MH(5) initiate movement to VNBS}}
M 44.00000 4194311 (403.79, 105.13, 0.00), (500.00, 200.00), 10.00
v 44 eval {set sim annotation {MH(6) initiate movement to VNBS}}
M 49.00000 4194312 (487.02, 21.90, 0.00), (500.00, 200.00), 10.00
v 49 eval {set sim_annotation {MH(7) initiate movement to VNBS}}
M 54.00000 4194313 (570.24, 438.68, 0.00), (500.00, 200.00), 10.00
v 54 eval {set sim_annotation {MH(8) initiate movement to VNBS}}
M 59.00000 4194314 (653.46, 355.46, 0.00), (500.00, 200.00), 10.00
v 59 eval {set sim_annotation {MH(9) initiate movement to VNBS}}
M 64.00000 4194315 (736.68, 272.23, 0.00), (500.00, 200.00), 10.00
v 64 eval {set sim annotation {MH(10) initiate movement to VNBS}}
M 69.00000 4194316 (319.90, 189.01, 0.00), (500.00, 200.00), 10.00
v 69 eval {set sim annotation {MH(11) initiate movement to VNBS}}
M 74.00000 4194317 (403.13, 105.79, 0.00), (500.00, 200.00), 10.00
v 74 eval {set sim_annotation {MH(12) initiate movement to VNBS}}
M 79.00000 4194318 (486.35, 22.57, 0.00), (500.00, 200.00), 10.00
v 79 eval {set sim_annotation {MH(13) initiate movement to VNBS}}
M 84.00000 4194319 (569.57, 439.35, 0.00), (500.00, 200.00), 10.00
v 84 eval {set sim annotation {MH(14) initiate movement to VNBS}}
M 89.00000 4194320 (652.79, 356.12, 0.00), (500.00, 200.00), 10.00
v 89 eval {set sim_annotation {MH(15) initiate movement to VNBS}}
M 94.00000 4194321 (736.02, 272.90, 0.00), (500.00, 200.00), 10.00
v 94 eval {set sim annotation {MH(16) initiate movement to VNBS}}
M 99.00000 4194322 (319.24, 189.68, 0.00), (500.00, 200.00), 10.00
v 99 eval {set sim_annotation {MH(17) initiate movement to VNBS}}
M 104.00000 4194323 (402.46, 106.46, 0.00), (500.00, 200.00), 10.00
v 104 eval {set sim_annotation {MH(18) initiate movement to VNBS}}
v 105 eval {set sim_annotation {Registering alice0@vnet.com}}
s 105.000000000 _14_ AGT  --- 364 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 105.007231000 _13_ AGT  --- 364 SIP_REGISTER 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 105.007231000  13  AGT  --- 365 SIP 407 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 105.011415000  14  AGT  --- 365 SIP 407 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 105.011682000 _14_ AGT  --- 366 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
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r 105.016002000 _13_ AGT  --- 366 SIP_REGISTER 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 105.016002000 _13_ AGT  --- 367 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 105.020206000 _14_ AGT  --- 367 SIP_200 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
M 109.00000 4194324 (485.68, 23.23, 0.00), (500.00, 200.00), 10.00
v 109 eval {set sim annotation {MH(19) initiate movement to VNBS}}
v 112.095888 eval {set sim annotation {alice0@vnet.com starts session to bob0@homenet.com}}
s 112.095888000  14  AGT  --- 376 SIP INVITE 800 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 112.103708000 _13_ AGT  --- 376 SIP_INVITE 820 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 112.103708000 _13_ AGT  --- 377 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
s 112.103708000 _13_ AGT  --- 378 SIP_INVITE 800 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 112.103708 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
- 112.103708 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
r 112.107712000  14  AGT  --- 377 SIP 100 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
r 112.30429 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
+ 112.30429 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
- 112.30429 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
r 112.314354 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
+ 112.314354 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
- 112.314354 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
+ 112.314354 2 3 SIP 800 ------- 0 2.0.0.0 2.0.1.0 -1 381
- 112.314354 2 3 SIP 800 ------- 0 2.0.0.0 2.0.1.0 -1 381
r 112.324374 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
+ 112.324374 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
- 112.324374 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
r 112.324418 2 3 SIP 800 ------- 0 2.0.0.0 2.0.1.0 -1 381
+ 112.324685 3 2 SIP 550 ------- 0 2.0.1.0 2.0.0.0 -1 383
- 112.324685 3 2 SIP 550 ------- 0 2.0.1.0 2.0.0.0 -1 383
r 112.334729 3 2 SIP 550 ------- 0 2.0.1.0 2.0.0.0 -1 383
+ 112.334729 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
- 112.334729 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
r 112.344773 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
+ 112.344773 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
- 112.344773 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
r 112.524556 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
r 112.524555636  13  AGT  --- 380 SIP 100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 112.545173 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
r 112.545172818 _13_ AGT  --- 384 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 112.545172818 _13_ AGT  --- 385 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 112.551012818 _14_ AGT  --- 385 SIP_183 570 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 112.551279818 _14_ AGT  --- 386 SIP_PRACK 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 112.555379818  13  AGT  --- 386 SIP PRACK 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 112.555379818  13  AGT  --- 387 SIP PRACK 300 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 112.55538 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 387
- 112.55538 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 387
r 112.755598 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 387
+ 112.755598 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 387
- 112.755598 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 387
r 112.765622 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 387
+ 112.765622 2 3 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 389
- 112.765622 2 3 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 389
r 112.775646 2 3 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 389
+ 112.775913 3 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 390
- 112.775913 3 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 390
+ 112.775913 3 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 391
- 112.775933 3 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 391
r 112.785933 3 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 390
+ 112.785933 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 393
- 112.785933 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 393
r 112.785953 3 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 391
+ 112.785953 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 394
- 112.785953 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 394
r 112.795953 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 393
+ 112.795953 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 393
- 112.795953 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 393
r 112.795973 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 394
+ 112.795973 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 394
- 112.796135 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 394
r 112.996135 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 393
r 112.996134818  13  AGT  --- 393 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 112.996134818 _13_ AGT  --- 395 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 112.996317 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 394
r 112.996316636  13  AGT  --- 394 SIP 180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 112.996316636  13  AGT  --- 396 SIP 180 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 112.999714818  14  AGT  --- 395 SIP 200 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
r 113.003918818 _14_ AGT  --- 396 SIP_180 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
v 115 eval {set sim_annotation {Registering alice2@vnet.com}}
s 115.000000000 _16_ AGT  --- 404 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 115.006891000 _13_ AGT  --- 404 SIP_REGISTER 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 115.006891000 _13_ AGT  --- 405 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 115.010795000 _16_ AGT  --- 405 SIP_407 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 115.011062000  16  AGT  --- 406 SIP REGISTER 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 115.015099000  13  AGT  --- 406 SIP REGISTER 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 115.015099000 _13_ AGT  --- 407 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
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r 115.019283000 _16_ AGT  --- 407 SIP_200 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
+ 115.652641 3 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 408
- 115.652641 3 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 408
r 115.662661 3 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 408
+ 115.662661 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 409
- 115.662661 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 409
r 115.672681 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 409
+ 115.672681 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 409
- 115.672681 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 409
r 115.872862 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 409
r 115.872862447 _13_ AGT  --- 409 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 115.872862447 _13_ AGT  --- 411 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 115.876582447  14  AGT  --- 411 SIP 200 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 115.876849447  14  AGT  --- 412 SIP ACK 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 115.881009447  13  AGT  --- 412 SIP ACK 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 115.881009447 _13_ AGT  --- 413 SIP_ACK 300 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 115.881009 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 413
- 115.881009 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 413
r 116.081228 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 413
+ 116.081228 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 413
- 116.081228 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 413
r 116.091252 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 413
+ 116.091252 2 3 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 414
- 116.091252 2 3 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 414
r 116.101276 2 3 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 414
v 125 eval {set sim annotation {Registering alice4@vnet.com}}
s 125.000000000 _18_ AGT  --- 426 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 125.007591000 _13_ AGT  --- 426 SIP_REGISTER 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 125.007591000 _13_ AGT  --- 427 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 125.011415000 _18_ AGT  --- 427 SIP_407 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 125.011682000 _18_ AGT  --- 428 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 125.015559000 _13_ AGT  --- 428 SIP_REGISTER 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 125.015559000  13  AGT  --- 429 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 125.019663000  18  AGT  --- 429 SIP 200 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
v 135 eval {set sim annotation {Registering alice6@vnet.com}}
s 135.000000000 _20_ AGT  --- 443 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 135.006991000 _13_ AGT  --- 443 SIP_REGISTER 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 135.006991000 _13_ AGT  --- 444 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 135.010935000 _20_ AGT  --- 444 SIP_407 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 135.011202000 _20_ AGT  --- 445 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 135.015042000  13  AGT  --- 445 SIP REGISTER 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 135.015042000  13  AGT  --- 446 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 135.019066000  20  AGT  --- 446 SIP 200 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
v 135.83897999999999 eval {set sim_annotation {alice2@vnet.com starts session to bob1@homenet.com}}
s 135.838980000 _16_ AGT  --- 450 SIP_INVITE 800 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 135.847180000 _13_ AGT  --- 450 SIP_INVITE 820 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 135.847180000 _13_ AGT  --- 451 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
s 135.847180000 _13_ AGT  --- 452 SIP_INVITE 800 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 135.84718 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 452
- 135.84718 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 452
r 135.850884000 _16_ AGT  --- 451 SIP_100 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
r 136.047762 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 452
+ 136.047762 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 452
- 136.047762 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 452
r 136.057826 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 452
+ 136.057826 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 453
- 136.057826 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 453
+ 136.057826 2 4 SIP 800 ------- 0 2.0.0.0 2.0.2.0 -1 454
- 136.057826 2 4 SIP 800 ------- 0 2.0.0.0 2.0.2.0 -1 454
r 136.067846 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 453
+ 136.067846 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 453
- 136.067846 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 453
r 136.06789 2 4 SIP 800 ------- 0 2.0.0.0 2.0.2.0 -1 454
+ 136.068157 4 2 SIP 550 ------- 0 2.0.2.0 2.0.0.0 -1 456
- 136.068157 4 2 SIP 550 ------- 0 2.0.2.0 2.0.0.0 -1 456
r 136.078201 4 2 SIP 550 ------- 0 2.0.2.0 2.0.0.0 -1 456
+ 136.078201 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 457
- 136.078201 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 457
r 136.088245 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 457
+ 136.088245 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 457
- 136.088245 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 457
r 136.268028 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 453
r 136.268027636  13  AGT  --- 453 SIP 100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 136.288645 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 457
r 136.288644818 _13_ AGT  --- 457 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 136.288644818 _13_ AGT  --- 458 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 136.294904818 _16_ AGT  --- 458 SIP_183 570 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 136.295171818 _16_ AGT  --- 459 SIP_PRACK 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 136.299111818 _13_ AGT  --- 459 SIP_PRACK 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 136.299111818 _13_ AGT  --- 460 SIP_PRACK 300 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 136.299112 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 460
- 136.299112 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 460
r 136.49933 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 460
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+ 136.49933 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 460
- 136.49933 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 460
r 136.509354 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 460
+ 136.509354 2 4 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 461
- 136.509354 2 4 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 461
r 136.519378 2 4 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 461
+ 136.519645 4 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 462
- 136.519645 4 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 462
+ 136.519645 4 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 463
- 136.519665 4 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 463
r 136.529665 4 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 462
+ 136.529665 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 464
- 136.529665 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 464
r 136.529685 4 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 463
+ 136.529685 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 465
- 136.529685 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 465
r 136.539685 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 464
+ 136.539685 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 464
- 136.539685 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 464
r 136.539705 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 465
+ 136.539705 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 465
- 136.539867 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 465
r 136.539867 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 464
r 136.739866818 _13_ AGT  --- 464 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 136.739866818  13  AGT  --- 466 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 136.740049 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 465
r 136.740048636 _13_ AGT  --- 465 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 136.740048636 _13_ AGT  --- 467 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 136.743386818 _16_ AGT  --- 466 SIP_200 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
r 136.747150818 _16_ AGT  --- 467 SIP_180 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
+ 137.816865 4 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 469
- 137.816865 4 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 469
r 137.826885 4 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 469
+ 137.826885 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 470
- 137.826885 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 470
r 137.836905 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 470
+ 137.836905 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 470
- 137.836905 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 470
r 138.037087 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 470
r 138.037087024 _13_ AGT  --- 470 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 138.037087024  13  AGT  --- 471 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 138.041027024  16  AGT  --- 471 SIP 200 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 138.041294024  16  AGT  --- 473 SIP ACK 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 138.048111617 _13_ AGT  --- 473 SIP_ACK 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 138.048111617 _13_ AGT  --- 474 SIP_ACK 300 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 138.048112 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 474
- 138.048112 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 474
r 138.24833 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 474
+ 138.24833 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 474
- 138.24833 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 474
r 138.258354 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 474
+ 138.258354 2 4 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 478
- 138.258354 2 4 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 478
r 138.268378 2 4 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 478
v 145 eval {set sim_annotation {Registering alice8@vnet.com}}
s 145.000000000 _22_ AGT  --- 491 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 145.007631000 _13_ AGT  --- 491 SIP_REGISTER 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 145.007631000 _13_ AGT  --- 492 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 145.011895000 _22_ AGT  --- 492 SIP_407 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 145.012162000 _22_ AGT  --- 493 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 145.016322000  13  AGT  --- 493 SIP REGISTER 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 145.016322000  13  AGT  --- 494 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 145.020326000  22  AGT  --- 494 SIP 200 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
v 146.121739999999999 eval {set sim_annotation {alice4@vnet.com starts session to bob2@homenet.com}}
s 146.121740000 _18_ AGT  --- 495 SIP_INVITE 800 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 146.130040000 _13_ AGT  --- 495 SIP_INVITE 820 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 146.130040000 _13_ AGT  --- 496 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
s 146.130040000 _13_ AGT  --- 497 SIP_INVITE 800 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 146.13004 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 497
- 146.13004 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 497
r 146.133744000 _18_ AGT  --- 496 SIP_100 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
r 146.330622 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 497
+ 146.330622 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 497
- 146.330622 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 497
r 146.340686 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 497
+ 146.340686 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 498
- 146.340686 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 498
+ 146.340686 2 5 SIP 800 ------- 0 2.0.0.0 2.0.3.0 -1 499
- 146.340686 2 5 SIP 800 ------- 0 2.0.0.0 2.0.3.0 -1 499
r 146.350706 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 498
+ 146.350706 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 498
- 146.350706 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 498
r 146.35075 2 5 SIP 800 ------- 0 2.0.0.0 2.0.3.0 -1 499
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+ 146.351017 5 2 SIP 550 ------- 0 2.0.3.0 2.0.0.0 -1 501
- 146.351017 5 2 SIP 550 ------- 0 2.0.3.0 2.0.0.0 -1 501
r 146.361061 5 2 SIP 550 ------- 0 2.0.3.0 2.0.0.0 -1 501
+ 146.361061 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 502
- 146.361061 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 502
r 146.371105 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 502
+ 146.371105 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 502
- 146.371105 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 502
r 146.550888 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 498
r 146.550887636 _13_ AGT  --- 498 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 146.571505 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 502
r 146.571504818 _13_ AGT  --- 502 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 146.571504818  13  AGT  --- 503 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 146.577464818  18  AGT  --- 503 SIP 183 570 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 146.577731818  18  AGT  --- 504 SIP PRACK 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 146.581611818 _13_ AGT  --- 504 SIP_PRACK 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 146.581611818 _13_ AGT  --- 505 SIP_PRACK 300 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 146.581612 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 505
- 146.581612 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 505
r 146.78183 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 505
+ 146.78183 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 505
- 146.78183 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 505
r 146.791854 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 505
+ 146.791854 2 5 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 506
- 146.791854 2 5 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 506
r 146.801878 2 5 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 506
+ 146.802145 5 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 507
- 146.802145 5 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 507
+ 146.802145 5 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 508
- 146.802165 5 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 508
r 146.812165 5 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 507
+ 146.812165 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 509
- 146.812165 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 509
r 146.812185 5 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 508
+ 146.812185 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 510
- 146.812185 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 510
r 146.822185 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 509
+ 146.822185 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 509
- 146.822185 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 509
r 146.822205 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 510
+ 146.822205 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 510
- 146.822367 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 510
r 147.022367 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 509
r 147.022366818 _13_ AGT  --- 509 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 147.022366818 _13_ AGT  --- 511 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 147.022549 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 510
r 147.022548636 _13_ AGT  --- 510 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 147.022548636 _13_ AGT  --- 512 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 147.026246818 _18_ AGT  --- 511 SIP_200 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
r 147.030150818 _18_ AGT  --- 512 SIP_180 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
+ 147.844838 5 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 513
- 147.844838 5 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 513
r 147.854858 5 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 513
+ 147.854858 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 514
- 147.854858 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 514
r 147.864878 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 514
+ 147.864878 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 514
- 147.864878 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 514
r 148.06506 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 514
r 148.065060228 _13_ AGT  --- 514 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 148.065060228  13  AGT  --- 515 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 148.068560228  18  AGT  --- 515 SIP 200 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 148.068827228  18  AGT  --- 516 SIP ACK 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 148.072707228 _13_ AGT  --- 516 SIP_ACK 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 148.072707228 _13_ AGT  --- 517 SIP_ACK 300 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 148.072707 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 517
- 148.072707 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 517
r 148.272925 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 517
+ 148.272925 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 517
- 148.272925 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 517
r 148.282949 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 517
+ 148.282949 2 5 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 520
- 148.282949 2 5 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 520
r 148.292973 2 5 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 520
v 149.350493 eval {set sim_annotation {alice6@vnet.com starts session to bob3@homenet.com}}
s 149.350493000 _20_ AGT  --- 523 SIP_INVITE 800 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 149.358573000 _13_ AGT  --- 523 SIP_INVITE 820 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 149.358573000 _13_ AGT  --- 524 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
s 149.358573000 _13_ AGT  --- 525 SIP_INVITE 800 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 149.358573 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 525
- 149.358573 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 525
r 149.362297000  20  AGT  --- 524 SIP 100 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
r 149.559155 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 525
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+ 149.559155 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 525
- 149.559155 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 525
r 149.569219 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 525
+ 149.569219 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 526
- 149.569219 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 526
+ 149.569219 2 6 SIP 800 ------- 0 2.0.0.0 2.0.4.0 -1 527
- 149.569219 2 6 SIP 800 ------- 0 2.0.0.0 2.0.4.0 -1 527
r 149.579239 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 526
+ 149.579239 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 526
- 149.579239 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 526
r 149.579283 2 6 SIP 800 ------- 0 2.0.0.0 2.0.4.0 -1 527
+ 149.57955 6 2 SIP 550 ------- 0 2.0.4.0 2.0.0.0 -1 529
- 149.57955 6 2 SIP 550 ------- 0 2.0.4.0 2.0.0.0 -1 529
r 149.589594 6 2 SIP 550 ------- 0 2.0.4.0 2.0.0.0 -1 529
+ 149.589594 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 530
- 149.589594 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 530
r 149.599638 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 530
+ 149.599638 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 530
- 149.599638 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 530
r 149.779421 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 526
r 149.779420636 _13_ AGT  --- 526 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 149.800038 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 530
r 149.800037818 _13_ AGT  --- 530 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 149.800037818 _13_ AGT  --- 531 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 149.805917818  20  AGT  --- 531 SIP 183 570 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 149.806184818  20  AGT  --- 532 SIP PRACK 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 149.810264818 _13_ AGT  --- 532 SIP_PRACK 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 149.810264818 _13_ AGT  --- 533 SIP_PRACK 300 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 149.810265 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 533
- 149.810265 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 533
r 150.010483 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 533
+ 150.010483 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 533
- 150.010483 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 533
r 150.020507 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 533
+ 150.020507 2 6 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 534
- 150.020507 2 6 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 534
r 150.030531 2 6 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 534
+ 150.030798 6 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 535
- 150.030798 6 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 535
+ 150.030798 6 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 536
- 150.030818 6 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 536
r 150.040818 6 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 535
+ 150.040818 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
- 150.040818 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
r 150.040838 6 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 536
+ 150.040838 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 538
- 150.040838 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 538
r 150.050838 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
+ 150.050838 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
- 150.050838 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
r 150.050858 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 538
+ 150.050858 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 538
- 150.05102 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 538
r 150.25102 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
r 150.251019818 _13_ AGT  --- 537 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 150.251019818 _13_ AGT  --- 539 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 150.251202 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 538
r 150.251201636 _13_ AGT  --- 538 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 150.251201636 _13_ AGT  --- 540 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 150.254839818 _20_ AGT  --- 539 SIP_200 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
r 150.259043818  20  AGT  --- 540 SIP 180 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
+ 152.72145 6 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 548
- 152.72145 6 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 548
r 152.73147 6 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 548
+ 152.73147 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 549
- 152.73147 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 549
r 152.74149 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 549
+ 152.74149 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 549
- 152.74149 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 549
r 152.941672 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 549
r 152.941671532 _13_ AGT  --- 549 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 152.941671532  13  AGT  --- 550 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 152.945291532  20  AGT  --- 550 SIP 200 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 152.945558532  20  AGT  --- 551 SIP ACK 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 152.949438532 _13_ AGT  --- 551 SIP_ACK 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 152.949438532 _13_ AGT  --- 552 SIP_ACK 300 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 152.949439 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 552
- 152.949439 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 552
r 153.149657 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 552
+ 153.149657 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 552
- 153.149657 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 552
r 153.159681 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 552
+ 153.159681 2 6 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 555
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- 153.159681 2 6 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 555
r 153.169705 2 6 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 555
v 155 eval {set sim_annotation {Registering alice10@vnet.com}}
s 155.000000000 _24_ AGT  --- 561 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 155.007051000  13  AGT  --- 561 SIP REGISTER 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 155.007051000  13  AGT  --- 562 SIP 407 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 155.010955000  24  AGT  --- 562 SIP 407 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 155.011222000 _24_ AGT  --- 563 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 155.015622000 _13_ AGT  --- 563 SIP_REGISTER 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 155.015622000 _13_ AGT  --- 564 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 155.019746000 _24_ AGT  --- 564 SIP_200 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
v 157.095888 eval {set sim_annotation {sipbob(0)@homenet.com say bye to sipalice(0)@vnet.com (any side may
terminate the call)}}
+ 157.095888 3 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 567
- 157.095888 3 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 567
r 157.105912 3 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 567
+ 157.105912 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 568
- 157.105912 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 568
r 157.115936 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 568
+ 157.115936 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 568
- 157.115936 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 568
r 157.316154 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 568
r 157.316154182 _13_ AGT  --- 568 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 157.316154182 _13_ AGT  --- 569 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 157.320374182  14  AGT  --- 569 SIP BYE 320 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 157.320641182  14  AGT  --- 570 SIP 200 250 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 157.324121182 _13_ AGT  --- 570 SIP_200 270 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 157.324121182 _13_ AGT  --- 571 SIP_200 250 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 157.324121 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 571
- 157.324121 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 571
r 157.524303 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 571
+ 157.524303 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 571
- 157.524303 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 571
r 157.534323 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 571
+ 157.534323 2 3 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 572
- 157.534323 2 3 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 572
r 157.544343 2 3 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 572
v 164.40281999999999 eval {set sim_annotation {alice8@vnet.com starts session to bob4@homenet.com}}
s 164.402820000 _22_ AGT  --- 583 SIP_INVITE 800 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 164.410820000 _13_ AGT  --- 583 SIP_INVITE 820 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 164.410820000  13  AGT  --- 584 SIP 100 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
s 164.410820000  13  AGT  --- 585 SIP INVITE 800 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 164.41082 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 585
- 164.41082 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 585
r 164.414864000 _22_ AGT  --- 584 SIP_100 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
r 164.611402 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 585
+ 164.611402 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 585
- 164.611402 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 585
r 164.621466 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 585
+ 164.621466 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 586
- 164.621466 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 586
+ 164.621466 2 7 SIP 800 ------- 0 2.0.0.0 2.0.5.0 -1 587
- 164.621466 2 7 SIP 800 ------- 0 2.0.0.0 2.0.5.0 -1 587
r 164.631486 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 586
+ 164.631486 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 586
- 164.631486 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 586
r 164.63153 2 7 SIP 800 ------- 0 2.0.0.0 2.0.5.0 -1 587
+ 164.631797 7 2 SIP 550 ------- 0 2.0.5.0 2.0.0.0 -1 589
- 164.631797 7 2 SIP 550 ------- 0 2.0.5.0 2.0.0.0 -1 589
r 164.641841 7 2 SIP 550 ------- 0 2.0.5.0 2.0.0.0 -1 589
+ 164.641841 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 590
- 164.641841 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 590
r 164.651885 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 590
+ 164.651885 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 590
- 164.651885 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 590
r 164.831668 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 586
r 164.831667636 _13_ AGT  --- 586 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 164.852285 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 590
r 164.852284818  13  AGT  --- 590 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 164.852284818 _13_ AGT  --- 591 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 164.858384818 _22_ AGT  --- 591 SIP_183 570 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 164.858651818  22  AGT  --- 592 SIP PRACK 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 164.862491818  13  AGT  --- 592 SIP PRACK 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 164.862491818  13  AGT  --- 593 SIP PRACK 300 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 164.862492 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 593
- 164.862492 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 593
v 165 eval {set sim_annotation {Registering alice12@vnet.com}}
s 165.000000000 _26_ AGT  --- 595 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 165.007331000 _13_ AGT  --- 595 SIP_REGISTER 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 165.007331000 _13_ AGT  --- 596 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 165.011275000  26  AGT  --- 596 SIP 407 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 165.011542000  26  AGT  --- 597 SIP REGISTER 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 165.015419000 _13_ AGT  --- 597 SIP_REGISTER 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
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s 165.015419000 _13_ AGT  --- 598 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 165.019203000 _26_ AGT  --- 598 SIP_200 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
r 165.06271 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 593
+ 165.06271 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 593
- 165.06271 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 593
r 165.072734 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 593
+ 165.072734 2 7 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 599
- 165.072734 2 7 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 599
r 165.082758 2 7 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 599
+ 165.083025 7 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 600
- 165.083025 7 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 600
+ 165.083025 7 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 601
- 165.083045 7 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 601
r 165.093045 7 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 600
+ 165.093045 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 602
- 165.093045 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 602
r 165.093065 7 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 601
+ 165.093065 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 603
- 165.093065 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 603
r 165.103065 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 602
+ 165.103065 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 602
- 165.103065 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 602
r 165.103085 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 603
+ 165.103085 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 603
- 165.103247 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 603
r 165.303247 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 602
r 165.303246818 _13_ AGT  --- 602 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 165.303246818 _13_ AGT  --- 605 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 165.303429 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 603
r 165.303428636 _13_ AGT  --- 603 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 165.303428636 _13_ AGT  --- 606 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 165.306906818 _22_ AGT  --- 605 SIP_200 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
r 165.310870818  22  AGT  --- 606 SIP 180 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
+ 166.358084 7 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 608
- 166.358084 7 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 608
r 166.368104 7 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 608
+ 166.368104 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 609
- 166.368104 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 609
r 166.378124 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 609
+ 166.378124 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 609
- 166.378124 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 609
r 166.578306 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 609
r 166.578305883  13  AGT  --- 609 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 166.578305883 _13_ AGT  --- 612 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 166.582205883 _22_ AGT  --- 612 SIP_200 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 166.582472883 _22_ AGT  --- 613 SIP_ACK 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 166.586292883 _13_ AGT  --- 613 SIP_ACK 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 166.586292883 _13_ AGT  --- 614 SIP_ACK 300 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 166.586293 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 614
- 166.586293 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 614
r 166.786511 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 614
+ 166.786511 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 614
- 166.786511 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 614
r 166.796535 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 614
+ 166.796535 2 7 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 615
- 166.796535 2 7 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 615
r 166.806559 2 7 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 615
v 175 eval {set sim_annotation {Registering alice14@vnet.com}}
s 175.000000000 _28_ AGT  --- 624 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 175.006731000 _13_ AGT  --- 624 SIP_REGISTER 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 175.006731000  13  AGT  --- 625 SIP 407 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 175.010655000  28  AGT  --- 625 SIP 407 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 175.010922000  28  AGT  --- 626 SIP REGISTER 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 175.015122000 _13_ AGT  --- 626 SIP_REGISTER 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 175.015122000 _13_ AGT  --- 627 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 175.019266000 _28_ AGT  --- 627 SIP_200 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
v 179.02224999999999 eval {set sim_annotation {alice10@vnet.com starts session to bob5@homenet.com}}
s 179.022250000 _24_ AGT  --- 639 SIP_INVITE 800 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 179.030590000  13  AGT  --- 639 SIP INVITE 820 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 179.030590000 _13_ AGT  --- 640 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
s 179.030590000 _13_ AGT  --- 641 SIP_INVITE 800 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 179.03059 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 641
- 179.03059 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 641
r 179.034774000  24  AGT  --- 640 SIP 100 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
r 179.231172 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 641
+ 179.231172 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 641
- 179.231172 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 641
r 179.241236 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 641
+ 179.241236 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 642
- 179.241236 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 642
+ 179.241236 2 8 SIP 800 ------- 0 2.0.0.0 2.0.6.0 -1 643
- 179.241236 2 8 SIP 800 ------- 0 2.0.0.0 2.0.6.0 -1 643
r 179.251256 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 642
```

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+ 179.251256 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 642
- 179.251256 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 642
r 179.2513 2 8 SIP 800 ------- 0 2.0.0.0 2.0.6.0 -1 643
+ 179.251567 8 2 SIP 550 ------- 0 2.0.6.0 2.0.0.0 -1 645
- 179.251567 8 2 SIP 550 ------- 0 2.0.6.0 2.0.0.0 -1 645
r 179.261611 8 2 SIP 550 ------- 0 2.0.6.0 2.0.0.0 -1 645
+ 179.261611 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 646
- 179.261611 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 646
r 179.271655 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 646
+ 179.271655 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 646
- 179.271655 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 646
r 179.451438 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 642
r 179.451437636  13  AGT  --- 642 SIP 100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 179.472055 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 646
r 179.472054818  13  AGT  --- 646 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 179.472054818 _13_ AGT  --- 647 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 179.478034818 _24_ AGT  --- 647 SIP_183 570 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 179.478301818 _24_ AGT  --- 648 SIP_PRACK 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 179.482361818 _13_ AGT  --- 648 SIP_PRACK 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 179.482361818 _13_ AGT  --- 649 SIP_PRACK 300 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 179.482362 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 649
- 179.482362 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 649
r 179.68258 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 649
+ 179.68258 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 649
- 179.68258 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 649
r 179.692604 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 649
+ 179.692604 2 8 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 650
- 179.692604 2 8 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 650
r 179.702628 2 8 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 650
+ 179.702895 8 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 651
- 179.702895 8 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 651
+ 179.702895 8 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 652
- 179.702915 8 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 652
r 179.712915 8 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 651
+ 179.712915 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
- 179.712915 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
r 179.712935 8 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 652
+ 179.712935 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 654
- 179.712935 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 654
r 179.722935 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
+ 179.722935 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
- 179.722935 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
r 179.722955 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 654
+ 179.722955 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 654
- 179.723117 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 654
r 179.923117 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
r 179.923116818 _13_ AGT  --- 653 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 179.923116818 _13_ AGT  --- 656 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 179.923299 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 654
r 179.923298636 _13_ AGT  --- 654 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 179.923298636 _13_ AGT  --- 657 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 179.926856818 _24_ AGT  --- 656 SIP_200 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
r 179.931020818  24  AGT  --- 657 SIP 180 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
v 180.83897999999999 eval {set sim annotation {sipbob(1)@homenet.com say bye to sipalice(2)@vnet.com (any side
may terminate the call)}}
+ 180.83898 4 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 662
- 180.83898 4 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 662
r 180.849004 4 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 662
+ 180.849004 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 663
- 180.849004 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 663
r 180.859028 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 663
+ 180.859028 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 663
- 180.859028 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 663
r 181.059246 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 663
r 181.059246182 _13_ AGT  --- 663 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 181.059246182 _13_ AGT  --- 664 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 181.063346182 _16_ AGT  --- 664 SIP_BYE 320 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 181.063613182 _16_ AGT  --- 665 SIP_200 250 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 181.067373182  13  AGT  --- 665 SIP 200 270 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 181.067373182 _13_ AGT  --- 666 SIP_200 250 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 181.067373 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 666
- 181.067373 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 666
r 181.267555 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 666
+ 181.267555 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 666
- 181.267555 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 666
r 181.277575 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 666
+ 181.277575 2 4 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 667
- 181.277575 2 4 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 667
r 181.287595 2 4 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 667
+ 181.42073 8 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 669
- 181.42073 8 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 669
r 181.43075 8 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 669
+ 181.43075 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 670
```

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- 181.43075 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 670
r 181.44077 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 670
+ 181.44077 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 670
- 181.44077 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 670
r 181.640952 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 670
r 181.640952184  13  AGT  --- 670 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 181.640952184  13  AGT  --- 671 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 181.644372184 _24_ AGT  --- 671 SIP_200 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 181.644639184 _24_ AGT  --- 672 SIP_ACK 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 181.648679184 _13_ AGT  --- 672 SIP_ACK 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 181.648679184 _13_ AGT  --- 673 SIP_ACK 300 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 181.648679 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 673
- 181.648679 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 673
r 181.848897 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 673
+ 181.848897 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 673
- 181.848897 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 673
r 181.858921 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 673
+ 181.858921 2 8 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 674
- 181.858921 2 8 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 674
r 181.868945 2 8 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 674
v 185 eval {set sim_annotation {Registering alice16@vnet.com}}
s 185.000000000 _30_ AGT  --- 678 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 185.007151000 _13_ AGT  --- 678 SIP_REGISTER 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 185.007151000 _13_ AGT  --- 679 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 185.010855000  30  AGT  --- 679 SIP 407 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 185.011122000  30  AGT  --- 680 SIP REGISTER 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 185.014939000 _13_ AGT  --- 680 SIP_REGISTER 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 185.014939000 _13_ AGT  --- 681 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 185.018883000 _30_ AGT  --- 681 SIP_200 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
v 188.56644 eval {set sim_annotation {alice12@vnet.com starts session to bob6@homenet.com}}
s 188.566440000 _26_ AGT  --- 685 SIP_INVITE 800 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 188.574640000 _13_ AGT  --- 685 SIP_INVITE 820 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 188.574640000  13  AGT  --- 686 SIP 100 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
s 188.574640000  13  AGT  --- 687 SIP INVITE 800 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 188.57464 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 687
- 188.57464 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 687
r 188.578764000 _26_ AGT  --- 686 SIP_100 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
r 188.775222 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 687
+ 188.775222 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 687
- 188.775222 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 687
r 188.785286 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 687
+ 188.785286 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 689
- 188.785286 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 689
+ 188.785286 2 9 SIP 800 ------- 0 2.0.0.0 2.0.7.0 -1 690
- 188.785286 2 9 SIP 800 ------- 0 2.0.0.0 2.0.7.0 -1 690
r 188.795306 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 689
+ 188.795306 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 689
- 188.795306 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 689
r 188.79535 2 9 SIP 800 ------- 0 2.0.0.0 2.0.7.0 -1 690
+ 188.795617 9 2 SIP 550 ------- 0 2.0.7.0 2.0.0.0 -1 692
- 188.795617 9 2 SIP 550 ------- 0 2.0.7.0 2.0.0.0 -1 692
r 188.805661 9 2 SIP 550 ------- 0 2.0.7.0 2.0.0.0 -1 692
+ 188.805661 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 693
- 188.805661 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 693
r 188.815705 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 693
+ 188.815705 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 693
- 188.815705 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 693
r 188.995488 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 689
r 188.995487636 _13_ AGT  --- 689 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 189.016105 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 693
r 189.016104818  13  AGT  --- 693 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 189.016104818  13  AGT  --- 694 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 189.022204818  26  AGT  --- 694 SIP 183 570 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 189.022471818 _26_ AGT  --- 695 SIP_PRACK 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 189.026791818 _13_ AGT  --- 695 SIP_PRACK 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 189.026791818 _13_ AGT  --- 696 SIP_PRACK 300 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 189.026792 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 696
- 189.026792 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 696
r 189.22701 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 696
+ 189.22701 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 696
- 189.22701 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 696
r 189.237034 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 696
+ 189.237034 2 9 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 698
- 189.237034 2 9 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 698
r 189.247058 2 9 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 698
+ 189.247325 9 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 699
- 189.247325 9 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 699
+ 189.247325 9 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 700
- 189.247345 9 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 700
r 189.257345 9 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 699
+ 189.257345 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 701
- 189.257345 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 701
r 189.257365 9 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 700
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```
+ 189.257365 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 702
- 189.257365 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 702
r 189.267365 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 701
+ 189.267365 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 701
- 189.267365 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 701
r 189.267385 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 702
+ 189.267385 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 702
- 189.267547 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 702
r 189.467547 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 701
r 189.467546818 _13_ AGT  --- 701 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 189.467546818 _13_ AGT  --- 704 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 189.467729 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 702
r 189.467728636  13  AGT  --- 702 SIP 180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 189.467728636  13  AGT  --- 705 SIP 180 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 189.471106818  26  AGT  --- 704 SIP 200 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
r 189.475210818 _26_ AGT  --- 705 SIP_180 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
v 191.12173999999999 eval {set sim_annotation {sipbob(2)@homenet.com say bye to sipalice(4)@vnet.com (any side
may terminate the call)}}
+ 191.12174 5 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 710
- 191.12174 5 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 710
r 191.131764 5 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 710
+ 191.131764 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 711
- 191.131764 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 711
r 191.141788 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 711
+ 191.141788 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 711
- 191.141788 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 711
+ 191.212338 9 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 713
- 191.212338 9 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 713
r 191.222358 9 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 713
+ 191.222358 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 714
- 191.222358 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 714
r 191.232378 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 714
+ 191.232378 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 714
- 191.232378 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 714
r 191.342006 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 711
r 191.342006182 _13_ AGT  --- 711 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 191.342006182 _13_ AGT  --- 715 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 191.346146182 _18_ AGT  --- 715 SIP_BYE 320 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 191.346413182 _18_ AGT  --- 716 SIP_200 250 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 191.350173182 _13_ AGT  --- 716 SIP_200 270 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 191.350173182  13  AGT  --- 717 SIP 200 250 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 191.350173 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 717
- 191.350173 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 717
r 191.43256 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 714
r 191.432559548 _13_ AGT  --- 714 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 191.432559548 _13_ AGT  --- 718 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 191.436179548 _26_ AGT  --- 718 SIP_200 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 191.436446548 _26_ AGT  --- 719 SIP_ACK 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 191.440246548 _13_ AGT  --- 719 SIP_ACK 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 191.440246548 _13_ AGT  --- 720 SIP_ACK 300 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 191.440247 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 720
- 191.440247 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 720
r 191.550355 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 717
+ 191.550355 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 717
- 191.550355 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 717
r 191.560375 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 717
+ 191.560375 2 5 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 721
- 191.560375 2 5 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 721
r 191.570395 2 5 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 721
r 191.640465 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 720
+ 191.640465 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 720
- 191.640465 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 720
r 191.650489 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 720
+ 191.650489 2 9 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 722
- 191.650489 2 9 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 722
r 191.660513 2 9 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 722
v 194.350493 eval {set sim_annotation {sipbob(3)@homenet.com say bye to sipalice(6)@vnet.com (any side may
terminate the call)}}
+ 194.350493 6 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 728
- 194.350493 6 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 728
r 194.360517 6 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 728
+ 194.360517 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 729
- 194.360517 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 729
r 194.370541 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 729
+ 194.370541 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 729
- 194.370541 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 729
r 194.570759 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 729
r 194.570759182 _13_ AGT  --- 729 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 194.570759182 _13_ AGT  --- 730 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 194.575159182 _20_ AGT  --- 730 SIP_BYE 320 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 194.575426182  20  AGT  --- 731 SIP 200 250 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 194.579366182  13  AGT  --- 731 SIP 200 270 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 194.579366182 _13_ AGT  --- 732 SIP_200 250 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
```

```
+ 194.579366 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 732
- 194.579366 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 732
r 194.779548 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 732
+ 194.779548 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 732
- 194.779548 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 732
r 194.789568 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 732
+ 194.789568 2 6 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 734
- 194.789568 2 6 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 734
r 194.799588 2 6 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 734
v 195 eval {set sim_annotation {Registering alice18@vnet.com}}
s 195.000000000 _32_ AGT  --- 737 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 195.007171000 _13_ AGT  --- 737 SIP_REGISTER 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 195.007171000  13  AGT  --- 738 SIP 407 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 195.011135000  32  AGT  --- 738 SIP 407 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 195.011402000  32  AGT  --- 739 SIP REGISTER 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 195.015359000 _13_ AGT  --- 739 SIP_REGISTER 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 195.015359000 _13_ AGT  --- 740 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 195.019183000 _32_ AGT  --- 740 SIP_200 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
v 200.01676899 eval {set sim_annotation {alice18@vnet.com starts session to bob9@homenet.com}}
s 200.016768990 _32_ AGT  --- 745 SIP_INVITE 800 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 200.024608990 _13_ AGT  --- 745 SIP_INVITE 820 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 200.024608990 _13_ AGT  --- 746 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
s 200.024608990 _13_ AGT  --- 747 SIP_INVITE 800 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 200.024609 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 747
- 200.024609 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 747
r 200.028492990  32  AGT  --- 746 SIP 100 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
r 200.225191 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 747
+ 200.225191 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 747
- 200.225191 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 747
r 200.235255 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 747
+ 200.235255 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 748
- 200.235255 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 748
+ 200.235255 2 12 SIP 800 ------- 0 2.0.0.0 2.0.10.0 -1 749
- 200.235255 2 12 SIP 800 ------- 0 2.0.0.0 2.0.10.0 -1 749
r 200.245275 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 748
+ 200.245275 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 748
- 200.245275 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 748
r 200.245319 2 12 SIP 800 ------- 0 2.0.0.0 2.0.10.0 -1 749
+ 200.245586 12 2 SIP 550 ------- 0 2.0.10.0 2.0.0.0 -1 751
- 200.245586 12 2 SIP 550 ------- 0 2.0.10.0 2.0.0.0 -1 751
r 200.25563 12 2 SIP 550 ------- 0 2.0.10.0 2.0.0.0 -1 751
+ 200.25563 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 752
- 200.25563 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 752
r 200.265674 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 752
+ 200.265674 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 752
- 200.265674 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 752
r 200.445457 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 748
r 200.445456626 _13_ AGT  --- 748 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 200.466074 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 752
r 200.466073808 _13_ AGT  --- 752 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 200.466073808 _13_ AGT  --- 753 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 200.472213808 _32_ AGT  --- 753 SIP_183 570 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 200.472480808  32  AGT  --- 754 SIP PRACK 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 200.476560808  13  AGT  --- 754 SIP PRACK 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 200.476560808 _13_ AGT  --- 755 SIP_PRACK 300 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 200.476561 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 755
- 200.476561 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 755
r 200.676779 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 755
+ 200.676779 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 755
- 200.676779 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 755
r 200.686803 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 755
+ 200.686803 2 12 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 757
- 200.686803 2 12 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 757
r 200.696827 2 12 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 757
+ 200.697094 12 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 758
- 200.697094 12 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 758
+ 200.697094 12 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 759
- 200.697114 12 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 759
r 200.707114 12 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 758
+ 200.707114 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 760
- 200.707114 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 760
r 200.707134 12 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 759
+ 200.707134 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 761
- 200.707134 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 761
r 200.717134 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 760
+ 200.717134 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 760
- 200.717134 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 760
r 200.717154 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 761
+ 200.717154 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 761
- 200.717316 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 761
r 200.917316 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 760
r 200.917315808  13  AGT  --- 760 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 200.917315808 _13_ AGT  --- 763 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
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r 200.917498 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 761
r 200.917497626 _13_ AGT  --- 761 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 200.917497626 _13_ AGT  --- 764 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 200.920735808 _32_ AGT  --- 763 SIP_200 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
r 200.924459808  32  AGT  --- 764 SIP 180 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
v 202.63265999999999 eval {set sim annotation {alice14@vnet.com starts session to bob7@homenet.com}}
s 202.632660000  28  AGT  --- 767 SIP INVITE 800 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 202.640820000 _13_ AGT  --- 767 SIP_INVITE 820 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 202.640820000 _13_ AGT  --- 768 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
s 202.640820000 _13_ AGT  --- 769 SIP_INVITE 800 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 202.64082 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 769
- 202.64082 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 769
r 202.644724000  28  AGT  --- 768 SIP 100 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
r 202.841402 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 769
+ 202.841402 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 769
- 202.841402 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 769
r 202.851466 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 769
+ 202.851466 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
- 202.851466 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
+ 202.851466 2 10 SIP 800 ------- 0 2.0.0.0 2.0.8.0 -1 771
- 202.851466 2 10 SIP 800 ------- 0 2.0.0.0 2.0.8.0 -1 771
r 202.861486 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
+ 202.861486 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
- 202.861486 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
r 202.86153 2 10 SIP 800 ------- 0 2.0.0.0 2.0.8.0 -1 771
+ 202.861797 10 2 SIP 550 ------- 0 2.0.8.0 2.0.0.0 -1 773
- 202.861797 10 2 SIP 550 ------- 0 2.0.8.0 2.0.0.0 -1 773
r 202.871841 10 2 SIP 550 ------- 0 2.0.8.0 2.0.0.0 -1 773
+ 202.871841 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 774
- 202.871841 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 774
r 202.881885 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 774
+ 202.881885 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 774
- 202.881885 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 774
r 203.061668 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
r 203.061667636  13  AGT  --- 770 SIP 100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 203.082285 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 774
r 203.082284818 _13_ AGT  --- 774 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 203.082284818 _13_ AGT  --- 775 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 203.088284818 _28_ AGT  --- 775 SIP_183 570 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 203.088551818 _28_ AGT  --- 776 SIP_PRACK 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 203.092851818  13  AGT  --- 776 SIP PRACK 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 203.092851818  13  AGT  --- 777 SIP PRACK 300 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 203.092852 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 777
- 203.092852 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 777
+ 203.18949 12 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 779
- 203.18949 12 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 779
r 203.19951 12 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 779
+ 203.19951 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 780
- 203.19951 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 780
r 203.20953 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 780
+ 203.20953 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 780
- 203.20953 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 780
r 203.29307 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 777
+ 203.29307 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 777
- 203.29307 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 777
r 203.303094 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 777
+ 203.303094 2 10 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 781
- 203.303094 2 10 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 781
r 203.313118 2 10 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 781
+ 203.313385 10 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 782
- 203.313385 10 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 782
+ 203.313385 10 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 783
- 203.313405 10 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 783
r 203.323405 10 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 782
+ 203.323405 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 784
- 203.323405 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 784
r 203.323425 10 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 783
+ 203.323425 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 785
- 203.323425 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 203.333425 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 784
+ 203.333425 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 784
- 203.333425 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 784
r 203.333445 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 785
+ 203.333445 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 785
- 203.333607 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 203.409711 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 780
r 203.409711390 _13_ AGT  --- 780 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 203.409711390 _13_ AGT  --- 786 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 203.413411390 _32_ AGT  --- 786 SIP_200 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 203.413678390 _32_ AGT  --- 787 SIP_ACK 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 203.418018390  13  AGT  --- 787 SIP ACK 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 203.418018390  13  AGT  --- 788 SIP ACK 300 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 203.418018 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 788
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- 203.418018 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 788
r 203.533607 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 784
r 203.533606818 _13_ AGT  --- 784 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 203.533606818 _13_ AGT  --- 790 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 203.533789 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 203.533788636  13  AGT  --- 785 SIP 180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 203.533788636  13  AGT  --- 791 SIP 180 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 203.537026818 _28_ AGT  --- 790 SIP_200 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
r 203.541010818 _28_ AGT  --- 791 SIP_180 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
r 203.618237 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 788
+ 203.618237 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 788
- 203.618237 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 788
r 203.628261 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 788
+ 203.628261 2 12 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 794
- 203.628261 2 12 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 794
r 203.638285 2 12 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 794
+ 204.733216 10 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 798
- 204.733216 10 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 798
r 204.743236 10 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 798
+ 204.743236 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 799
- 204.743236 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 799
r 204.753256 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 799
+ 204.753256 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 799
- 204.753256 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 799
r 204.953438 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 799
r 204.953438124  13  AGT  --- 799 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 204.953438124 _13_ AGT  --- 801 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 204.957058124 _28_ AGT  --- 801 SIP_200 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 204.957325124 _28_ AGT  --- 802 SIP_ACK 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 204.961705124 _13_ AGT  --- 802 SIP_ACK 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 204.961705124 _13_ AGT  --- 803 SIP_ACK 300 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 204.961705 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 803
- 204.961705 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 803
r 205.161923 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 803
+ 205.161923 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 803
- 205.161923 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 803
r 205.171947 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 803
+ 205.171947 2 10 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 804
- 205.171947 2 10 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 804
r 205.181971 2 10 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 804
v 209.40281999999999 eval {set sim annotation {sipbob(4)@homenet.com say bye to sipalice(8)@vnet.com (any side
may terminate the call)}}
+ 209.40282 7 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 811
- 209.40282 7 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 811
r 209.412844 7 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 811
+ 209.412844 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 812
- 209.412844 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 812
r 209.422868 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 812
+ 209.422868 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 812
- 209.422868 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 812
r 209.623086 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 812
r 209.623086182 _13_ AGT  --- 812 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 209.623086182  13  AGT  --- 813 SIP BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 209.626926182  22  AGT  --- 813 SIP BYE 320 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 209.627193182 _22_ AGT  --- 814 SIP_200 250 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 209.630953182 _13_ AGT  --- 814 SIP_200 270 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 209.630953182 _13_ AGT  --- 815 SIP_200 250 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 209.630953 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 815
- 209.630953 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 815
r 209.831135 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 815
+ 209.831135 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 815
- 209.831135 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 815
r 209.841155 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 815
+ 209.841155 2 7 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 817
- 209.841155 2 7 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 817
r 209.851175 2 7 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 817
v 223.25593000000001 eval {set sim_annotation {alice16@vnet.com starts session to bob8@homenet.com}}
s 223.255930000 _30_ AGT  --- 838 SIP_INVITE 800 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 223.263750000  13  AGT  --- 838 SIP INVITE 820 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 223.263750000 _13_ AGT  --- 839 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
s 223.263750000 _13_ AGT  --- 840 SIP_INVITE 800 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 223.26375 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 840
- 223.26375 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 840
r 223.267614000  30  AGT  --- 839 SIP 100 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
r 223.464332 13 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 840
+ 223.464332 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 840
- 223.464332 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 840
r 223.474396 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 840
+ 223.474396 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 841
- 223.474396 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 841
+ 223.474396 2 11 SIP 800 ------- 0 2.0.0.0 2.0.9.0 -1 842
- 223.474396 2 11 SIP 800 ------- 0 2.0.0.0 2.0.9.0 -1 842
r 223.484416 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 841
```

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+ 223.484416 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 841
- 223.484416 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 841
r 223.48446 2 11 SIP 800 ------- 0 2.0.0.0 2.0.9.0 -1 842
+ 223.484727 11 2 SIP 550 ------- 0 2.0.9.0 2.0.0.0 -1 844
- 223.484727 11 2 SIP 550 ------- 0 2.0.9.0 2.0.0.0 -1 844
r 223.494771 11 2 SIP 550 ------- 0 2.0.9.0 2.0.0.0 -1 844
+ 223.494771 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
- 223.494771 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
r 223.504815 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
+ 223.504815 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
- 223.504815 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
r 223.684598 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 841
r 223.684597636  13  AGT  --- 841 SIP 100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
r 223.705215 0 13 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
r 223.705214818  13  AGT  --- 845 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 223.705214818 _13_ AGT  --- 846 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 223.711334818 _30_ AGT  --- 846 SIP_183 570 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 223.711601818 _30_ AGT  --- 847 SIP_PRACK 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 223.715961818 _13_ AGT  --- 847 SIP_PRACK 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 223.715961818 _13_ AGT  --- 848 SIP_PRACK 300 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 223.715962 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 848
- 223.715962 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 848
r 223.91618 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 848
+ 223.91618 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 848
- 223.91618 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 848
r 223.926204 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 848
+ 223.926204 2 11 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 849
- 223.926204 2 11 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 849
r 223.936228 2 11 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 849
+ 223.936495 11 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 850
- 223.936495 11 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 850
+ 223.936495 11 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 851
- 223.936515 11 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 851
r 223.946515 11 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 850
+ 223.946515 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 852
- 223.946515 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 852
r 223.946535 11 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 851
+ 223.946535 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 853
- 223.946535 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 853
r 223.956535 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 852
+ 223.956535 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 852
- 223.956535 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 852
r 223.956555 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 853
+ 223.956555 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 853
- 223.956717 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 853
v 224.02224999999999 eval {set sim_annotation {sipbob(5)@homenet.com say bye to sipalice(10)@vnet.com (any side
may terminate the call)}}
+ 224.02225 8 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 854
- 224.02225 8 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 854
r 224.032274 8 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 854
+ 224.032274 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 855
- 224.032274 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 855
r 224.042298 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 855
+ 224.042298 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 855
- 224.042298 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 855
r 224.156717 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 852
r 224.156716818 _13_ AGT  --- 852 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 224.156716818 _13_ AGT  --- 856 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 224.156899 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 853
r 224.156898636 _13_ AGT  --- 853 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 224.156898636  13  AGT  --- 857 SIP 180 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 224.160676818  30  AGT  --- 856 SIP 200 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
r 224.164540818  30  AGT  --- 857 SIP 180 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
r 224.242516 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 855
r 224.242516182 _13_ AGT  --- 855 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 224.242516182 _13_ AGT  --- 858 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 224.246336182 _24_ AGT  --- 858 SIP_BYE 320 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 224.246603182 _24_ AGT  --- 859 SIP_200 250 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 224.250183182  13  AGT  --- 859 SIP 200 270 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 224.250183182 _13_ AGT  --- 860 SIP_200 250 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 224.250183 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 860
- 224.250183 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 860
r 224.450365 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 860
+ 224.450365 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 860
- 224.450365 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 860
r 224.460385 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 860
+ 224.460385 2 8 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 861
- 224.460385 2 8 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 861
r 224.470405 2 8 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 861
+ 225.904103 11 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 867
- 225.904103 11 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 867
r 225.914123 11 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 867
+ 225.914123 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 868
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- 225.914123 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 868
r 225.924143 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 868
+ 225.924143 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 868
- 225.924143 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 868
r 226.124325 0 13 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 868
r 226.124325244  13  AGT  --- 868 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 226.124325244  13  AGT  --- 870 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 226.127885244 _30_ AGT  --- 870 SIP_200 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 226.128152244 _30_ AGT  --- 871 SIP_ACK 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 226.132512244 _13_ AGT  --- 871 SIP_ACK 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 226.132512244 _13_ AGT  --- 872 SIP_ACK 300 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 226.132512 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
- 226.132512 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
r 226.33273 13 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
+ 226.33273 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
- 226.33273 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
r 226.342754 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
+ 226.342754 2 11 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 873
- 226.342754 2 11 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 873
r 226.352778 2 11 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 873
v 233.56644 eval {set sim_annotation {sipbob(6)@homenet.com say bye to sipalice(12)@vnet.com (any side may
terminate the call)}}
+ 233.56644 9 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 887
- 233.56644 9 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 887
r 233.576464 9 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 887
+ 233.576464 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 888
- 233.576464 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 888
r 233.586488 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 888
+ 233.586488 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 888
- 233.586488 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 888
r 233.786706 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 888
r 233.786706182 _13_ AGT  --- 888 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 233.786706182  13  AGT  --- 889 SIP BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 233.790586182  26  AGT  --- 889 SIP BYE 320 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 233.790853182  26  AGT  --- 890 SIP 200 250 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 233.794453182 _13_ AGT  --- 890 SIP_200 270 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 233.794453182 _13_ AGT  --- 891 SIP_200 250 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 233.794453 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 891
- 233.794453 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 891
r 233.994635 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 891
+ 233.994635 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 891
- 233.994635 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 891
r 234.004655 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 891
+ 234.004655 2 9 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 892
- 234.004655 2 9 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 892
r 234.014675 2 9 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 892
v 245.01676899 eval {set sim_annotation {sipbob(9)@homenet.com say bye to sipalice(18)@vnet.com (any side may
terminate the call)}}
+ 245.016769 12 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 910
- 245.016769 12 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 910
r 245.026793 12 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 910
+ 245.026793 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 911
- 245.026793 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 911
r 245.036817 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 911
+ 245.036817 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 911
- 245.036817 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 911
r 245.237035 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 911
r 245.237035172 _13_ AGT  --- 911 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 245.237035172 _13_ AGT  --- 913 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 245.241095172 _32_ AGT  --- 913 SIP_BYE 320 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 245.241362172  32  AGT  --- 914 SIP 200 250 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 245.245102172  13  AGT  --- 914 SIP 200 270 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 245.245102172  13  AGT  --- 915 SIP 200 250 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 245.245102 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 915
- 245.245102 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 915
r 245.445284 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 915
+ 245.445284 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 915
- 245.445284 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 915
r 245.455304 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 915
+ 245.455304 2 12 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 916
- 245.455304 2 12 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 916
r 245.465324 2 12 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 916
v 247.63265999999999 eval {set sim annotation {sipbob(7)@homenet.com say bye to sipalice(14)@vnet.com (any side
may terminate the call)}}
+ 247.63266 10 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 922
- 247.63266 10 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 922
r 247.642684 10 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 922
+ 247.642684 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 923
- 247.642684 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 923
r 247.652708 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 923
+ 247.652708 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 923
- 247.652708 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 923
r 247.852926 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 923
```

```
r 247.852926182 _13_ AGT  --- 923 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 247.852926182 _13_ AGT  --- 924 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 247.857006182 _28_ AGT  --- 924 SIP_BYE 320 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 247.857273182 _28_ AGT  --- 925 SIP_200 250 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 247.860773182  13  AGT  --- 925 SIP 200 270 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 247.860773182  13  AGT  --- 926 SIP 200 250 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 247.860773 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
- 247.860773 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
r 248.060955 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
+ 248.060955 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
- 248.060955 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
r 248.070975 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
+ 248.070975 2 10 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 927
- 248.070975 2 10 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 927
r 248.080995 2 10 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 927
v 268.25593000000003 eval {set sim_annotation {sipbob(8)@homenet.com say bye to sipalice(16)@vnet.com (any side
may terminate the call)}}
+ 268.25593 11 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 957
- 268.25593 11 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 957
r 268.265954 11 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 957
+ 268.265954 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 958
- 268.265954 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 958
r 268.275978 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 958
+ 268.275978 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 958
- 268.275978 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 958
r 268.476196 0 13 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 958
r 268.476196182 _13_ AGT  --- 958 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 30 0]
s 268.476196182 _13_ AGT  --- 961 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 268.480596182 _30_ AGT  --- 961 SIP_BYE 320 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 268.480863182 _30_ AGT  --- 962 SIP_200 250 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 268.484783182 _13_ AGT  --- 962 SIP_200 270 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 268.484783182 _13_ AGT  --- 963 SIP_200 250 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 268.484783 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 963
- 268.484783 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 963
r 268.684965 13 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 963
+ 268.684965 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 963
- 268.684965 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 963
r 268.694985 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 963
+ 268.694985 2 11 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 965
- 268.694985 2 11 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 965
r 268.705005 2 11 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 965
```

Figure C.3 File trace of scenario 8 and seed position of 110 for Cooperative Model.

C.2 Roaming SIP in Brokered Model

C.2.1 Script tcl

In the Figure C.4 demonstrates the script code for roaming SIP in Brokered Model. We had selected the same scenario and value for the seed position with the intention of put focus in the similar and discrepancy in the models analyzed.

```
# ======================================================================
#ROAMING SIP IN BROKERED MODEL
 ##Author: Dulce Selene Rosas Mendieta
# Date : 09/agosto/2009
#File name: SipRB.tcl
#
# ======================================================================
# Define options
# ======================================================================

set val(numMsnodes)          10              ;# number of mobilenodes
set val(vel)                 10              ;# speed of MH
set val(seedpos)             110             ;# seed position

set val(chan)   Channel/WirelessChannel      ;# channel type
set val(prop)   Propagation/TwoRayGround     ;# radio-propagation model
```

```
set val(netif)  Phy/WirelessPhy                 ;# network interface type
set val(mac)    Mac/802_11                      ;# MAC type
set val(ifq)    Queue/DropTail/PriQueue         ;# interface queue type
set val(ll)     LL                              ;# link layer type
set val(ant)    Antenna/OmniAntenna             ;# antenna model
set val(ifqlen)       50                        ;# max packet in ifq
set val(adhocRouting)   DSDV                    ;# routing protocol

set val(dHN)          0.01                      ;# Transmission delay among the GGSN, the IMS, and the SIPAAA
set val(di)           0.20                      ;# Internet delay
set val(SIPPckS)      587                       ;# SIP packet size
set val(VNBW)         11000000                  ;# VN Internet Bandwidth
set val(RBBW)         20000000                  ;# RB Internet Bandwidth
set val(VoIPCODEC)    13300                     ;# VoIP codec

set val(x)              800.0                   ;# x coordinate of topology
set val(y)              400.0                   ;# y coordinate of topology

set val(xhnbs)          200.0                   ;# x coordinate of center HN Basestation
set val(yhnbs)          200.0                   ;# y coordinate of center HN Basestation

set val(xvnbs)          500.0                   ;# x coordinate of center VN Basestation
set val(yvnbs)          200.0                   ;# y coordinate of center VN Basestation

set val(xrb)                    350.0           ;# x coordinate of RB
set val(yrb)                    200.0           ;# y coordinate of RB

set val(simseed)        101                     ;# Seed value for exponential variable
set val(arrvavg)        10                      ;# Average interarrival time
set val(SimStopTime)  600                       ;# Simulation Time

# ======================================================================
# Main Program
# ======================================================================

# create simulator instance
set ns_ [new Simulator]

# set up for hierarchical routing
$ns_ node-config -addressType hierarchical
AddrParams set domain_num_ 4                    ;# number of domains
lappend cluster_num 1 1 1 1                     ;# number of clusters in each domain
AddrParams set cluster_num_ $cluster_num
lappend eilastlevel 2 [expr [expr 2*$val(numMsnodes)] + 1] [expr $val(numMsnodes) + 1] 1;# number of nodes in each cluster
AddrParams set nodes_num_ $eilastlevel ;# of each domain

#trace Information
set tracefd  [open WNSipRB-out.tr w]
set nf [open WNSipRBout.nam w]
$ns_ trace-all $tracefd
$ns_ namtrace-all-wireless $nf $val(x) $val(y)

#create topography object
set topo [new Topography]

#define topology
$topo load_flatgrid $val(x) $val(y)

#create God
create-god [expr $val(numMsnodes) + 1]

#table of colors
$ns_ color 0 blue
$ns_ color 1 green
$ns_ color 2 gold
$ns_ color 3 red
```

```
#create IMS, GGSN, AAA
set GGSN [$ns_ node 0.0.0]
$GGSN set X_ [expr $val(xhnbs) + 50.00]
$GGSN set Y_ $val(yhnbs)
$GGSN set Z_ 0.00
$GGSN color red
$GGSN shape box

set AAA [$ns_ node 0.0.1]
$AAA set X_ [expr $val(xhnbs) - 75.00]
$AAA set Y_ $val(yhnbs)
$AAA set Z_ 0.00
$AAA color orange
$AAA shape box

set IMS [$ns_ node 2.0.0]
$IMS set X_ [expr $val(xhnbs) - 50.00]
$IMS set Y_ [expr $val(yhnbs) + 100.00]
$IMS set Z_ 0.00
$IMS shape box

set RB [$ns_ node 3.0.0]
$RB set X_ $val(xrb)
$RB set Y_ $val(yrb)
$RB set Z_ 0.00
$RB color chocolate
$RB shape hexagon

# SIP UAs called from callers MH
for {set i 0} {$i < $val(numMsnodes)} {incr i} {
        set W($i) [$ns_ node 2.0.[expr $i + 1]]
        puts "IMS UA($i) created"
        #set position of Ws
        $W($i) set X_ [expr $val(xhnbs) - 240 + [expr $i + 1] * $val(numMsnodes)]
        $W($i) set Y_ [expr $val(yhnbs) + 120.00]
        $W($i) set Z_ 0.00
        $W($i) color green
        #set link
        $ns_ duplex-link $IMS $W($i) 100Mb 10ms DropTail
}

#####################################################
# Configure WLAN Access Point #
#####################################################
#-------------------------------------------------------------
$ns_ node-config -adhocRouting $val(adhocRouting) \
        -llType $val(ll) \
        -macType $val(mac) \
        -ifqType $val(ifq) \
        -ifqLen $val(ifqlen) \
        -antType $val(ant) \
        -propType $val(prop) \
        -phyType $val(netif) \
        -channelType $val(chan) \
                -topoInstance $topo \
        -wiredRouting ON \
                -agentTrace ON \
        -routerTrace OFF \
        -macTrace OFF
#-------------------------------------------------------------

#create VN Access Point
set VNBS [$ns_ node 1.0.0]
$VNBS random-motion 0
puts "Base-Station node VN created"

#position (fixed) for base-station node (VNBS)
```

```
$VNBS set X_ $val(xvnbs)
$VNBS set Y_ $val(yvnbs)
$VNBS set Z_ 0.00
$VNBS radius 250
$VNBS color blue
$VNBS shape hexagon

#setup Mobilenodes VN
$ns_ node-config -wiredRouting OFF

#create MH && here random position initial &  mobility
 for {set i 0} {$i < [expr $val(numMsnodes) *2 ]} {incr i} {
            set MH($i) [$ns_ node 1.0.[expr $i + 1]]
            puts "Wireless node MH($i) created"
            $MH($i) base-station [AddrParams addr2id [$VNBS node-addr]  ;# provide each MH with hier-add in VNBS
            $MH($i) random-motion 0

            #here uniform random values
            $defaultRNG seed [expr $val(seedpos) + $i]
            set posRNG1 [new RNG]
            set posX_ [new RandomVariable/Uniform]
            $posX_ set min_ -250
            $posX_ set max_ 250
            $posX_ use-rng $posRNG1

            $defaultRNG seed [expr $val(seedpos) - $i]
            set posRNG2 [new RNG]
            set posY_ [new RandomVariable/Uniform]
            $posY_ set min_ -250
            $posY_ set max_ 250
            $posY_ use-rng $posRNG2

            set tempX($i) [expr $val(xvnbs) + [$posX_ value]]
            set tempY($i) [expr $val(yhnbs) + [$posY_ value]]

            #set Initial positions with random
            $MH($i) set X_ $tempX($i);        #$posX_ value
            $MH($i) set Y_ $tempY($i);        # $posY_ value
            $MH($i) set Z_ 0.00
            #puts "$i x= $tempX($i)  y=$tempY($i)"

            #set the direction of movement (to VNBS)
            set MovTime($i) [expr [expr $i+1 ] * 5 + $val(numMsnodes)-1 ]
            $ns_ at $MoveTime($i) "$MH($i) setdest $val(xvnbs) $val(yvnbs) $val(vel)"
            $ns_ at $MoveTime($i) "$ns_ trace-annotate \"MH($i) initiate movement to VNBS\""
            #puts "at $MovTime($i)  MH($i) inicia mov to VNBS"
}

#create links between VN and HN
$ns_ duplex-link $VNBS $RB 11Mb 200ms DropTail
$ns_ duplex-link $RB $GGSN 20Mb 200ms DropTail
$ns_ duplex-link $GGSN $AAA 100Mb 10ms DropTail
$ns_ duplex-link $GGSN $IMS 100Mb 10ms DropTail

$ns_ duplex-link-op $VNBS $RB color "chocolate"
$ns_ duplex-link-op $VNBS $RB orient left
$ns_ duplex-link-op $RB $GGSN color "chocolate"
$ns_ duplex-link-op $RB $GGSN orient left
$ns_ duplex-link-op $GGSN $AAA color "yellow"
$ns_ duplex-link-op $GGSN $AAA orient left
$ns_ duplex-link-op $GGSN $IMS color "green"
$ns_ duplex-link-op $GGSN $IMS orient up

#set up proxy servers
#VN Proxy
$VNBS label-color black
$VNBS label "AP proxy.vnet.com"
```

```
set serveraddrVN [$VNBS node-addr]
set sipVN [new Agent/SIPProxy vnet.com]
$ns_ attach-agent $VNBS $sipVN

#HN Proxy
$IMS label-color green
$IMS label "IMS proxy.homenet.com"
set serveraddrHN [$IMS node-addr]
set sipHN [new Agent/SIPProxy homenet.com]
$ns_ attach-agent $IMS $sipHN

#set up Routing Broker
$RB label "rb.broker.com"
set serveraddrRB [$RB node-addr]
set sipRB [new Agent/SIPRB routingbroker.com]
$ns_ attach-agent $RB $sipRB
puts "RB created"

#processing delays
Agent/SIPUA set sipdelay_  0.000267;# esta para 11M para 2M seria 0.001493
Agent/SIPUA set sdpdelay_ 0.0
Agent/SIPProxy set sipdelay_ 0.201641   ; #esta para 11 p 2M ee igual: 0.201908
Agent/SIPProxy set sdpdelay_ 0.0
Agent/SIPRB set sipdelay_ 0.201641
Agent/SIPRB set sdpdelay_ 0.0

#set up SIP-User agents Wireless
 for {set i 0} {$i < $val(numMsnodes)} {incr i} {
            # User agents called Wireless Nodes
            $W($i) label-color black
            $W($i) label "bob$i@homenet.com"
            set sipbob($i) [new Agent/SIPUA bob$i homenet.com]
            $ns_ attach-agent $W($i) $sipbob($i)
            $W($i) set fid_ 2
            #setup outbound proxies
            $sipbob($i) set-proxy $serveraddrHN
            #configure receiving terminals for complex response, waiting between 1 and 3
            $sipbob($i) set simple_ 0
            $sipbob($i) set minAnsDel_ 1.0
            $sipbob($i) set maxAnsDel_ 3.0
            #user agents calling Wireless Nodes
            $MH([expr $i *2]) label-color blue
            $MH([expr $i *2]) label "alice[expr $i *2]@vnet.com"
            set sipalice([expr $i *2]) [new Agent/SIPUA alice[expr $i *2] vnet.com]
            $ns_ attach-agent $MH([expr $i *2]) $sipalice([expr $i *2])
            $MH([expr $i *2]) set fid_ 3
            # Setup outbound proxies
            $sipalice([expr $i *2]) set-proxy $serveraddrVN
 }

# Set Record-Route on proxies
$sipHN set recordRoute_ 1
$sipVN set recordRoute_ 2
$sipRB set recordRoute_ 2

#puts "creando DNS"
#register proxies with DNS "God"
DNSGod register proxy vnet.com $serveraddrVN
DNSGod register proxy homenet.com $serveraddrHN
DNSGod register proxy routingbroker.com $serveraddrRB

#set traffic pattern of VN nodes - Interarrivaltimes
$defaultRNG seed $val(simseed)
set arrivalRNG [new RNG]
set arrival_ [new RandomVariable/Exponential]
$arrival_ set avg_ $val(arrvavg)
$arrival_ use-rng $arrivalRNG
```

```
#Registering in VN, only the middle are detected & registered
 for {set i 0} {$i < $val(numMsnodes)} {incr i} {
            # Register nodes at HN home
            $ns_ at $i+1 "$ns_ trace-annotate \"Registering bob$i@homenet.com\""
            $ns_ at $i+1 "$sipbob($i) register"

            set RegTime [expr [expr $i + $val(numMsnodes)] * 10 + 5]; #each 10 sec
            set SesTime($i) [expr $RegTime + 5 + [$arrival_ value]]
            set ByeTime($i) [expr $SesTime($i) + 45]
            puts "MH([expr $i *2]) is in coverage area & registering in VNBS at [format "%-8.3f " $RegTime]"
            $ns_ at $RegTime "$ns_ trace-annotate \"Registering alice[expr $i *2]@vnet.com\""
            $ns_ at $RegTime "$sipalice([expr $i *2]) register"
            $ns_ at $RegTime "$MH([expr $i *2]) add-mark m1 blue circle"
 }

#Iniviting to stablish sessions
 for {set i 0} {$i < $val(numMsnodes)} {incr i} {
            puts "MH([expr $i *2]) initiates session at [format "%-8.3f " $SesTime($i)]"
            $ns_ at $SesTime($i) "$ns_ trace-annotate \"alice[expr $i *2]@vnet.com starts session to bob$i@homenet.com\""
            $ns_ at $SesTime($i) "$sipalice([expr $i *2]) invite bob$i homenet.com bw 13.3kb 13.3kb"
            $ns_ at $SesTime($i) "$MH([expr $i *2]) delete-mark m1"
            $ns_ at $SesTime($i) "$MH([expr $i *2]) add-mark m2 green hexagon"

 }
# Finishing with bye sessions
 for {set i 0} {$i < $val(numMsnodes)} {incr i} {
            $ns_ at $ByeTime($i) "$ns_ trace-annotate \"sipbob($i)@homenet.com say bye to sipalice([expr $i *2])@vnet.com (any side may
terminate the call)\""
            $ns_ at $ByeTime($i) "$sipbob($i) bye"
            $ns_ at $ByeTime($i) "$MH([expr $i *2]) delete-mark m2"
            $ns_ at $ByeTime($i) "$MH([expr $i *2]) add-mark m3 black"
            puts "MH([expr $i *2]) and W($i) bye session at [format "%-8.3f " $ByeTime($i)]"
 }

#para movimientos despues de estar cerca de la BSVN
 set NewVel  [expr $val(vel)/4]
 if {$val(vel) == 1} { set NewVel 2}
 for {set i 0} {$i < $val(numMsnodes)} {incr i} {
            #puts "--------nodo $i"
            set distance sqrt([expr pow([expr $val(yvnbs)- $tempY($i)],2) + pow([expr $val(xhnbs)-$tempX($i)],2)])
            set tim [expr $distance/$val(vel)]
            set newMoveTime($i) [expr $MoveTime($i)+ $tim +[expr $val(numMsnodes)+$i] ]
            $ns_ at $newMoveTime($i) "$ns_ trace-annotate \"MH($i) initiate move to any place at new vel\""
            set temp $MH($i)
            #$ns_ at $newMoveTime($i) start ;
            $ns_ at $newMoveTime($i) "$temp setdest $tempX($i) $tempY($i) $NewVel"
      puts "para ($i) = $newMoveTime($i) vel$NewVel"
            set t [expr $val(numMsnodes)- 1 ]
            if {$ByeTime($t) < $newMoveTime($i) } {
               break
            }
 }

#this for always position the last Num-5 nodes after arrives very near of the VNBS
 for {set j $val(numMsnodes)} { $j < [expr $val(numMsnodes) *2] } {incr j} {
             set distance sqrt([expr pow([expr $val(yvnbs)-$tempY($j)],2) + pow([expr $val(xhnbs)-$tempX($j)],2)])

             set newMoveTime($j) [expr $MoveTime($j)+ [expr $distance/$val(vel)] + [expr $val(numMsnodes)+1+$j]*2 ]
             $ns_ at  $newMoveTime($j) "$ns_ trace-annotate \"MH($j) initiate move to any place at new vel\""
#            $ns_ at $newMoveTime($j) start ;# $ns_ at  $newMoveTime($j) "$MH($j) setdest $tempX($j) $tempY($j) $NewVel"
#             puts "new time mov of ($j) = $newMoveTime($j)"
            set t [expr $val(numMsnodes)- 1 ]
            if {$ByeTime($t) < $newMoveTime($j) } {
               break
            }
 }
```

```
#some useful headers for tracefile
 puts $tracefd “M 0.0 numMsnodes $val(numMsnodes) vel:$val(vel) x:$val(x) y: $val(y) rp:$val(adhocRouting)”
 puts $tracefd “M 0.0 seedPos $val(seedpos) seed_interrarival $val(simseed)”
 puts $tracefd “M 0.0 prop $val(prop) ant $val(ant)”

 puts "Starting Simulation..."

#Define node initial position in nam, only for nam
 for {set i 0} {$i < $val(numMsnodes) } {incr i} {
            $ns_ initial_node_pos $MH($i) 7
 }

#put nodes in place again
 $ns_ at 0.0 “$ns_ dump-namnodes”

#tell all nodes when the simulation ends
 for {set i 0} {$i < $val(numMsnodes) } {incr i} {
            $ns_ at $val(SimStopTime).0 “$MH($i) reset”;
            $ns_ at $val(SimStopTime).0 “$MH($i) reset”;
 }

$ns_ at $val(SimStopTime).0 "$VNBS reset";
$ns_ at $val(SimStopTime).0002 “puts \”NS EXITING...\” ; $ns_ halt”
$ns_ at $val(SimStopTime).0001 “stop”

proc stop {} {
            global ns_ tracefd namtrace nf
            close $tracefd
            close $nf
}

$ns_ run
```

Figure C.4 Tcl script for roaming SIP in Brokered Model

.tr trace file generated

After run the script in the NS2 shell executable command (ns obtained with the script awk. Each table is obtained after applied the awk file to the

```
M 0.0 numMsnodes 10 vel:10 x:800.0 y: 400.0 rp:DSDV
M 0.0 seedPos 110 seed_interrarival 101
M 0.0 prop Propagation/TwoRayGround ant Antenna/OmniAntenna
v 0 eval {set sim_annotation {Registering bob0@homenet.com}}
+ 0 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 0
- 0 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 0
r 0.010024 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 0
+ 0.010024 2 4 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 1
- 0.010024 2 4 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 1
r 0.020044 2 4 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 1
+ 0.020311 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 2
- 0.020311 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 2
r 0.030335 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 2
+ 0.030335 2 4 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 3
- 0.030335 2 4 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 3
r 0.040355 2 4 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 3
v 1 eval {set sim annotation {Registering bob1@homenet.com}}
+ 1 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 12
- 1 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 12
r 1.010024 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 12
+ 1.010024 2 5 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 13
- 1.010024 2 5 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 13
r 1.020044 2 5 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 13
```

```
+ 1.020311 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 16
- 1.020311 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 16
r 1.030335 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 16
+ 1.030335 2 5 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 17
- 1.030335 2 5 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 17
r 1.040355 2 5 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 17
v 2 eval {set sim annotation {Registering bob2@homenet.com}}
+ 2 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 29
- 2 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 29
r 2.010024 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 29
+ 2.010024 2 6 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 30
- 2.010024 2 6 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 30
r 2.020044 2 6 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 30
+ 2.020311 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 31
- 2.020311 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 31
r 2.030335 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 31
+ 2.030335 2 6 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 32
- 2.030335 2 6 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 32
r 2.040355 2 6 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 32
v 3 eval {set sim_annotation {Registering bob3@homenet.com}}
+ 3 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 33
- 3 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 33
r 3.010024 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 33
+ 3.010024 2 7 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 34
- 3.010024 2 7 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 34
r 3.020044 2 7 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 34
+ 3.020311 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 35
- 3.020311 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 35
r 3.030335 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 35
+ 3.030335 2 7 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 36
- 3.030335 2 7 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 36
r 3.040355 2 7 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 36
v 4 eval {set sim annotation {Registering bob4@homenet.com}}
+ 4 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 37
- 4 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 37
r 4.010024 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 37
+ 4.010024 2 8 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 38
- 4.010024 2 8 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 38
r 4.020044 2 8 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 38
+ 4.020311 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 39
- 4.020311 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 39
r 4.030335 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 39
+ 4.030335 2 8 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 40
- 4.030335 2 8 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 40
r 4.040355 2 8 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 40
v 5 eval {set sim_annotation {Registering bob5@homenet.com}}
+ 5 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 41
- 5 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 41
r 5.010024 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 41
+ 5.010024 2 9 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 42
- 5.010024 2 9 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 42
r 5.020044 2 9 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 42
+ 5.020311 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 43
- 5.020311 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 43
r 5.030335 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 43
+ 5.030335 2 9 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 44
- 5.030335 2 9 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 44
r 5.040355 2 9 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 44
v 6 eval {set sim_annotation {Registering bob6@homenet.com}}
+ 6 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 45
- 6 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 45
r 6.010024 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 45
+ 6.010024 2 10 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 46
- 6.010024 2 10 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 46
r 6.020044 2 10 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 46
+ 6.020311 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 47
- 6.020311 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 47
r 6.030335 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 47
+ 6.030335 2 10 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 48
- 6.030335 2 10 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 48
r 6.040355 2 10 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 48
v 7 eval {set sim annotation {Registering bob7@homenet.com}}
+ 7 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 49
- 7 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 49
r 7.010024 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 49
+ 7.010024 2 11 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 50
- 7.010024 2 11 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 50
r 7.020044 2 11 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 50
+ 7.020311 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 51
- 7.020311 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 51
r 7.030335 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 51
+ 7.030335 2 11 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 52
- 7.030335 2 11 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 52
```

```
r 7.040355 2 11 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 52
v 8 eval {set sim_annotation {Registering bob8@homenet.com}}
+ 8 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 53
- 8 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 53
r 8.010024 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 53
+ 8.010024 2 12 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 54
- 8.010024 2 12 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 54
r 8.020044 2 12 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 54
+ 8.020311 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 55
- 8.020311 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 55
r 8.030335 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 55
+ 8.030335 2 12 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 56
- 8.030335 2 12 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 56
r 8.040355 2 12 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 56
v 9 eval {set sim annotation {Registering bob9@homenet.com}}
+ 9 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 57
- 9 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 57
r 9.010024 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 57
+ 9.010024 2 13 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 58
- 9.010024 2 13 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 58
r 9.020044 2 13 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 58
+ 9.020311 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 59
- 9.020311 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 59
r 9.030335 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 59
+ 9.030335 2 13 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 60
- 9.030335 2 13 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 60
r 9.040355 2 13 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 60
M 14.00000 4194305 (404.46, 104.46, 0.00), (500.00, 200.00), 10.00
v 14 eval {set sim_annotation {MH(0) initiate movement to VNBS}}
M 19.00000 4194306 (487.68, 21.24, 0.00), (500.00, 200.00), 10.00
v 19 eval {set sim_annotation {MH(1) initiate movement to VNBS}}
M 24.00000 4194307 (570.90, 438.01, 0.00), (500.00, 200.00), 10.00
v 24 eval {set sim annotation {MH(2) initiate movement to VNBS}}
M 29.00000 4194308 (654.13, 354.79, 0.00), (500.00, 200.00), 10.00
v 29 eval {set sim annotation {MH(3) initiate movement to VNBS}}
M 34.00000 4194309 (737.35, 271.57, 0.00), (500.00, 200.00), 10.00
v 34 eval {set sim_annotation {MH(4) initiate movement to VNBS}}
M 39.00000 4194310 (320.57, 188.35, 0.00), (500.00, 200.00), 10.00
v 39 eval {set sim_annotation {MH(5) initiate movement to VNBS}}
M 44.00000 4194311 (403.79, 105.13, 0.00), (500.00, 200.00), 10.00
v 44 eval {set sim annotation {MH(6) initiate movement to VNBS}}
M 49.00000 4194312 (487.02, 21.90, 0.00), (500.00, 200.00), 10.00
v 49 eval {set sim annotation {MH(7) initiate movement to VNBS}}
M 54.00000 4194313 (570.24, 438.68, 0.00), (500.00, 200.00), 10.00
v 54 eval {set sim_annotation {MH(8) initiate movement to VNBS}}
M 59.00000 4194314 (653.46, 355.46, 0.00), (500.00, 200.00), 10.00
v 59 eval {set sim_annotation {MH(9) initiate movement to VNBS}}
M 64.00000 4194315 (736.68, 272.23, 0.00), (500.00, 200.00), 10.00
v 64 eval {set sim_annotation {MH(10) initiate movement to VNBS}}
M 69.00000 4194316 (319.90, 189.01, 0.00), (500.00, 200.00), 10.00
v 69 eval {set sim_annotation {MH(11) initiate movement to VNBS}}
M 74.00000 4194317 (403.13, 105.79, 0.00), (500.00, 200.00), 10.00
v 74 eval {set sim annotation {MH(12) initiate movement to VNBS}}
M 79.00000 4194318 (486.35, 22.57, 0.00), (500.00, 200.00), 10.00
v 79 eval {set sim_annotation {MH(13) initiate movement to VNBS}}
M 84.00000 4194319 (569.57, 439.35, 0.00), (500.00, 200.00), 10.00
v 84 eval {set sim_annotation {MH(14) initiate movement to VNBS}}
M 89.00000 4194320 (652.79, 356.12, 0.00), (500.00, 200.00), 10.00
v 89 eval {set sim_annotation {MH(15) initiate movement to VNBS}}
M 94.00000 4194321 (736.02, 272.90, 0.00), (500.00, 200.00), 10.00
v 94 eval {set sim annotation {MH(16) initiate movement to VNBS}}
M 99.00000 4194322 (319.24, 189.68, 0.00), (500.00, 200.00), 10.00
v 99 eval {set sim annotation {MH(17) initiate movement to VNBS}}
M 104.00000 4194323 (402.46, 106.46, 0.00), (500.00, 200.00), 10.00
v 104 eval {set sim_annotation {MH(18) initiate movement to VNBS}}
v 105 eval {set sim_annotation {Registering alice0@vnet.com}}
s 105.000000000 _15_ AGT  --- 364 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 105.007231000 _14_ AGT  --- 364 SIP_REGISTER 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 105.007231000  14  AGT  --- 365 SIP 407 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 105.011415000 _15_ AGT  --- 365 SIP_407 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 105.011682000 _15_ AGT  --- 366 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 105.016002000  14  AGT  --- 366 SIP REGISTER 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 105.016002000  14  AGT  --- 367 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 105.020206000  15  AGT  --- 367 SIP 200 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
M 109.00000 4194324 (485.68, 23.23, 0.00), (500.00, 200.00), 10.00
v 109 eval {set sim_annotation {MH(19) initiate movement to VNBS}}
v 112.095888 eval {set sim_annotation {alice0@vnet.com starts session to bob0@homenet.com}}
s 112.095888000 _15_ AGT  --- 376 SIP_INVITE 800 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 112.103708000 _14_ AGT  --- 376 SIP_INVITE 820 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 112.103708000 _14_ AGT  --- 377 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
s 112.103708000  14  AGT  --- 378 SIP INVITE 800 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 112.103708 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
- 112.103708 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
```

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r 112.107712000 _15_ AGT  --- 377 SIP_100 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
r 112.30429 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
+ 112.30429 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
- 112.30429 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
r 112.50461 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
+ 112.50461 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
- 112.50461 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
r 112.514674 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
+ 112.514674 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
- 112.514674 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
+ 112.514674 2 4 SIP 800 ------- 0 2.0.0.0 2.0.1.0 -1 381
- 112.514674 2 4 SIP 800 ------- 0 2.0.0.0 2.0.1.0 -1 381
r 112.524694 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
+ 112.524694 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
- 112.524694 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
r 112.524738 2 4 SIP 800 ------- 0 2.0.0.0 2.0.1.0 -1 381
+ 112.525005 4 2 SIP 550 ------- 0 2.0.1.0 2.0.0.0 -1 383
- 112.525005 4 2 SIP 550 ------- 0 2.0.1.0 2.0.0.0 -1 383
r 112.535049 4 2 SIP 550 ------- 0 2.0.1.0 2.0.0.0 -1 383
+ 112.535049 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
- 112.535049 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
r 112.545093 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
+ 112.545093 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
- 112.545093 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
s 112.603708000  14  AGT  --- 378 SIP INVITE 800 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 112.603708 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
- 112.603708 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
r 112.724794 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
+ 112.724794 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
- 112.724794 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
r 112.745313 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
+ 112.745313 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
- 112.745313 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
r 112.80429 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
+ 112.80429 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
- 112.80429 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
r 112.924976 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 380
r 112.924975636 _14_ AGT  --- 380 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 112.945713 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
r 112.945712818 _14_ AGT  --- 384 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 112.945712818  14  AGT  --- 387 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 112.951832818  15  AGT  --- 387 SIP 183 570 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 112.952099818  15  AGT  --- 388 SIP PRACK 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 112.956479818 _14_ AGT  --- 388 SIP_PRACK 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 112.956479818 _14_ AGT  --- 389 SIP_PRACK 300 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 112.95648 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
- 112.95648 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
r 113.00461 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
+ 113.00461 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
- 113.00461 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
r 113.014674 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 378
+ 113.014674 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
- 113.014674 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
r 113.024718 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
+ 113.024718 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
- 113.024718 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
+ 113.025005 4 2 SIP 550 ------- 0 2.0.1.0 2.0.0.0 -1 383
- 113.025005 4 2 SIP 550 ------- 0 2.0.1.0 2.0.0.0 -1 383
r 113.035049 4 2 SIP 550 ------- 0 2.0.1.0 2.0.0.0 -1 383
+ 113.035049 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 390
- 113.035049 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 390
r 113.045093 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 390
+ 113.045093 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 390
- 113.045093 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 390
r 113.156698 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
+ 113.156698 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
- 113.156698 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
r 113.224938 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
+ 113.224938 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
- 113.224938 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
r 113.245313 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 390
+ 113.245313 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 390
- 113.245313 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 390
r 113.356818 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
+ 113.356818 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
- 113.356818 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
r 113.366842 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
+ 113.366842 2 4 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 395
- 113.366842 2 4 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 395
r 113.376866 2 4 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 395
+ 113.377133 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 396
- 113.377133 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 396
+ 113.377133 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 397
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- 113.377153 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 397
r 113.387153 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 396
+ 113.387153 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
- 113.387153 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
r 113.387173 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 397
+ 113.387173 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 399
- 113.387173 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 399
r 113.397173 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
+ 113.397173 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
- 113.397173 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
r 113.397193 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 399
+ 113.397193 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 399
- 113.397273 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 399
r 113.425338 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 384
r 113.425337818  14  AGT  --- 384 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 113.425337818 _14_ AGT  --- 400 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 113.431737818 _15_ AGT  --- 400 SIP_183 570 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
r 113.445713 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 390
r 113.445712818 _14_ AGT  --- 390 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 113.445712818 _14_ AGT  --- 401 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 113.451752818 _15_ AGT  --- 401 SIP_183 570 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 113.452099818 _15_ AGT  --- 388 SIP_PRACK 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 113.456439818 _14_ AGT  --- 388 SIP_PRACK 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 113.456479818 _14_ AGT  --- 389 SIP_PRACK 300 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 113.45648 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
- 113.45648 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
r 113.597273 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
+ 113.597273 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
- 113.597273 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
r 113.597373 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 399
+ 113.597373 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 399
- 113.597455 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 399
r 113.656698 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
+ 113.656698 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
- 113.656698 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
r 113.797455 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
r 113.797454818 _14_ AGT  --- 398 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 113.797454818 _14_ AGT  --- 403 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 113.797637 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 399
r 113.797636636 _14_ AGT  --- 399 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 113.797636636  14  AGT  --- 404 SIP 180 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 113.800914818  15  AGT  --- 403 SIP 200 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
r 113.804878818  15  AGT  --- 404 SIP 180 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
r 113.856818 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
+ 113.856818 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
- 113.856818 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
r 113.866842 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 389
+ 113.866842 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
- 113.866842 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
r 113.876862 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
+ 113.876862 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
- 113.876862 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
r 114.076962 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
+ 114.076962 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
- 114.076962 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
r 114.277144 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 398
r 114.277143818 _14_ AGT  --- 398 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
v 115 eval {set sim_annotation {Registering alice2@vnet.com}}
s 115.000000000 _17_ AGT  --- 407 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 115.006771000 _14_ AGT  --- 407 SIP_REGISTER 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 115.006771000  14  AGT  --- 408 SIP 407 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 115.010655000  17  AGT  --- 408 SIP 407 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 115.010922000  17  AGT  --- 409 SIP REGISTER 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 115.014959000 _14_ AGT  --- 409 SIP_REGISTER 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 115.014959000 _14_ AGT  --- 410 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 115.018643000 _17_ AGT  --- 410 SIP_200 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
+ 115.47905 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 411
- 115.47905 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 411
r 115.48907 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 411
+ 115.48907 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 412
- 115.48907 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 412
r 115.49909 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 412
+ 115.49909 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 412
- 115.49909 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 412
r 115.69919 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 412
+ 115.69919 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 412
- 115.69919 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 412
r 115.899372 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 412
r 115.899371949 _14_ AGT  --- 412 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 115.899371949 _14_ AGT  --- 414 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 115.903271949  15  AGT  --- 414 SIP 200 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 115.903538949  15  AGT  --- 415 SIP ACK 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 115.907358949 _14_ AGT  --- 415 SIP_ACK 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
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s 115.907358949 _14_ AGT  --- 416 SIP_ACK 300 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 115.907359 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 416
- 115.907359 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 416
+ 115.97905 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 411
- 115.97905 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 411
r 115.98907 4 2 SIP 250 ------- 0 2.0.1.0 2.0.0.0 -1 411
+ 115.98907 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 417
- 115.98907 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 417
r 115.99909 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 417
+ 115.99909 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 417
- 115.99909 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 417
r 116.107577 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 416
+ 116.107577 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 416
- 116.107577 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 416
r 116.19919 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 417
+ 116.19919 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 417
- 116.19919 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 417
r 116.307697 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 416
+ 116.307697 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 416
- 116.307697 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 416
r 116.317721 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 416
+ 116.317721 2 4 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 418
- 116.317721 2 4 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 418
r 116.327745 2 4 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 418
r 116.399372 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 417
r 116.399371949  14  AGT  --- 417 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 116.399371949 _14_ AGT  --- 419 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 116.402851949 _15_ AGT  --- 419 SIP_200 270 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 116.403118949 _15_ AGT  --- 420 SIP_ACK 300 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 116.407438949 _14_ AGT  --- 420 SIP_ACK 320 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 116.407438949 _14_ AGT  --- 421 SIP_ACK 300 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 116.407439 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 421
- 116.407439 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 421
r 116.607657 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 421
+ 116.607657 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 421
- 116.607657 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 421
r 116.807777 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 421
+ 116.807777 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 421
- 116.807777 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 421
r 116.817801 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 421
+ 116.817801 2 4 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 422
- 116.817801 2 4 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 422
r 116.827825 2 4 SIP 300 ------- 0 2.0.0.0 2.0.1.0 -1 422
v 125 eval {set sim_annotation {Registering alice4@vnet.com}}
s 125.000000000 _19_ AGT  --- 434 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 125.007371000 _14_ AGT  --- 434 SIP_REGISTER 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 125.007371000 _14_ AGT  --- 435 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 125.011535000 _19_ AGT  --- 435 SIP_407 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 125.011802000 _19_ AGT  --- 436 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 125.015882000 _14_ AGT  --- 436 SIP_REGISTER 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 125.015882000 _14_ AGT  --- 437 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 125.019806000 _19_ AGT  --- 437 SIP_200 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
v 135 eval {set sim annotation {Registering alice6@vnet.com}}
s 135.000000000  21  AGT  --- 452 SIP REGISTER 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 135.007851000 _14_ AGT  --- 452 SIP_REGISTER 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 135.007851000 _14_ AGT  --- 453 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 135.011915000 _21_ AGT  --- 453 SIP_407 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 135.012182000 _21_ AGT  --- 454 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 135.016482000 _14_ AGT  --- 454 SIP_REGISTER 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 135.016482000 _14_ AGT  --- 455 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 135.020606000  21  AGT  --- 455 SIP 200 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
v 135.83897999999999 eval {set sim annotation {alice2@vnet.com starts session to bob1@homenet.com}}
s 135.838980000  17  AGT  --- 457 SIP INVITE 800 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 135.847060000 _14_ AGT  --- 457 SIP_INVITE 820 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 135.847060000 _14_ AGT  --- 458 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
s 135.847060000 _14_ AGT  --- 459 SIP_INVITE 800 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 135.84706 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
- 135.84706 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
r 135.850984000  17  AGT  --- 458 SIP 100 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
r 136.047642 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
+ 136.047642 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
- 136.047642 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
r 136.247962 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
+ 136.247962 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
- 136.247962 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
r 136.258026 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
+ 136.258026 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 462
- 136.258026 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 462
+ 136.258026 2 5 SIP 800 ------- 0 2.0.0.0 2.0.2.0 -1 463
- 136.258026 2 5 SIP 800 ------- 0 2.0.0.0 2.0.2.0 -1 463
r 136.268046 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 462
+ 136.268046 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 462
- 136.268046 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 462
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r 136.26809 2 5 SIP 800 ------- 0 2.0.0.0 2.0.2.0 -1 463
+ 136.268357 5 2 SIP 550 ------- 0 2.0.2.0 2.0.0.0 -1 465
- 136.268357 5 2 SIP 550 ------- 0 2.0.2.0 2.0.0.0 -1 465
r 136.278401 5 2 SIP 550 ------- 0 2.0.2.0 2.0.0.0 -1 465
+ 136.278401 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
- 136.278401 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
r 136.288445 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
+ 136.288445 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
- 136.288445 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
s 136.347060000 _14_ AGT  --- 459 SIP_INVITE 800 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 136.34706 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
- 136.34706 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
r 136.468146 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 462
+ 136.468146 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 462
- 136.468146 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 462
r 136.488665 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
+ 136.488665 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
- 136.488665 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
r 136.547642 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
+ 136.547642 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
- 136.547642 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
r 136.668328 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 462
r 136.668327636 _14_ AGT  --- 462 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 136.689065 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
r 136.689064818  14  AGT  --- 466 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 136.689064818  14  AGT  --- 469 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 136.694984818 _17_ AGT  --- 469 SIP_183 570 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 136.695251818 _17_ AGT  --- 470 SIP_PRACK 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 136.699631818 _14_ AGT  --- 470 SIP_PRACK 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 136.699631818 _14_ AGT  --- 471 SIP_PRACK 300 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 136.699632 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
- 136.699632 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
r 136.747962 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
+ 136.747962 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
- 136.747962 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
r 136.758026 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 459
+ 136.758026 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
- 136.758026 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
r 136.76807 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
+ 136.76807 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
- 136.76807 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
+ 136.768357 5 2 SIP 550 ------- 0 2.0.2.0 2.0.0.0 -1 465
- 136.768357 5 2 SIP 550 ------- 0 2.0.2.0 2.0.0.0 -1 465
r 136.778401 5 2 SIP 550 ------- 0 2.0.2.0 2.0.0.0 -1 465
+ 136.778401 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 472
- 136.778401 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 472
r 136.788445 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 472
+ 136.788445 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 472
- 136.788445 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 472
r 136.89985 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
+ 136.89985 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
- 136.89985 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
r 136.96829 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
+ 136.96829 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
- 136.96829 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
r 136.988665 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 472
+ 136.988665 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 472
- 136.988665 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 472
r 137.09997 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
+ 137.09997 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
- 137.09997 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
r 137.109994 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
+ 137.109994 2 5 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 473
- 137.109994 2 5 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 473
r 137.120018 2 5 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 473
+ 137.120285 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 474
- 137.120285 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 474
+ 137.120285 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 475
- 137.120305 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 475
r 137.130305 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 474
+ 137.130305 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
- 137.130305 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
r 137.130325 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 475
+ 137.130325 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 478
- 137.130325 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 478
r 137.140325 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
+ 137.140325 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
- 137.140325 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
r 137.140345 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 478
+ 137.140345 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 478
- 137.140425 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 478
r 137.16869 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 466
r 137.168689818 _14_ AGT  --- 466 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
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s 137.168689818 _14_ AGT  --- 479 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 137.174649818 _17_ AGT  --- 479 SIP_183 570 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
r 137.189065 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 472
r 137.189064818 _14_ AGT  --- 472 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 137.189064818  14  AGT  --- 480 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 137.195244818  17  AGT  --- 480 SIP 183 570 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 137.195251818  17  AGT  --- 470 SIP PRACK 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 137.199508818 _14_ AGT  --- 470 SIP_PRACK 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 137.199631818 _14_ AGT  --- 471 SIP_PRACK 300 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 137.199632 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
- 137.199632 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
r 137.340425 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
+ 137.340425 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
- 137.340425 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
r 137.340525 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 478
+ 137.340525 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 478
- 137.340607 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 478
r 137.39985 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
+ 137.39985 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
- 137.39985 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
r 137.540607 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
r 137.540606818 _14_ AGT  --- 477 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 137.540606818 _14_ AGT  --- 481 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 137.540789 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 478
r 137.540788636  14  AGT  --- 478 SIP 180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 137.540788636  14  AGT  --- 482 SIP 180 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 137.544166818 _17_ AGT  --- 481 SIP_200 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
r 137.547970818 _17_ AGT  --- 482 SIP_180 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
r 137.59997 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
+ 137.59997 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
- 137.59997 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
r 137.609994 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 471
+ 137.609994 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
- 137.609994 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
r 137.620014 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
+ 137.620014 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
- 137.620014 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
r 137.820114 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
+ 137.820114 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
- 137.820114 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
r 138.020296 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 477
r 138.020295818  14  AGT  --- 477 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
+ 139.991355 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 487
- 139.991355 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 487
r 140.001375 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 487
+ 140.001375 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 488
- 140.001375 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 488
r 140.011395 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 488
+ 140.011395 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 488
- 140.011395 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 488
r 140.211495 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 488
+ 140.211495 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 488
- 140.211495 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 488
r 140.411676 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 488
r 140.411676357 _14_ AGT  --- 488 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 140.411676357 _14_ AGT  --- 491 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 140.415596357 _17_ AGT  --- 491 SIP_200 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 140.415863357 _17_ AGT  --- 492 SIP_ACK 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 140.420143357 _14_ AGT  --- 492 SIP_ACK 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 140.420143357 _14_ AGT  --- 493 SIP_ACK 300 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 140.420143 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 493
- 140.420143 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 493
+ 140.491355 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 487
- 140.491355 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 487
r 140.501375 5 2 SIP 250 ------- 0 2.0.2.0 2.0.0.0 -1 487
+ 140.501375 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 494
- 140.501375 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 494
r 140.511395 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 494
+ 140.511395 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 494
- 140.511395 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 494
r 140.620362 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 493
+ 140.620362 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 493
- 140.620362 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 493
r 140.711495 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 494
+ 140.711495 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 494
- 140.711495 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 494
r 140.820482 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 493
+ 140.820482 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 493
- 140.820482 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 493
r 140.830506 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 493
+ 140.830506 2 5 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 496
- 140.830506 2 5 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 496
r 140.84053 2 5 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 496
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r 140.911676 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 494
r 140.911676357 _14_ AGT  --- 494 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 140.911676357 _14_ AGT  --- 498 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 140.915376357 _17_ AGT  --- 498 SIP_200 270 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 140.915643357  17  AGT  --- 499 SIP ACK 300 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 140.919943357  14  AGT  --- 499 SIP ACK 320 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 140.919943357  14  AGT  --- 500 SIP ACK 300 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 140.919943 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 500
- 140.919943 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 500
r 141.120162 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 500
+ 141.120162 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 500
- 141.120162 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 500
r 141.320282 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 500
+ 141.320282 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 500
- 141.320282 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 500
r 141.330306 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 500
+ 141.330306 2 5 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 501
- 141.330306 2 5 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 501
r 141.34033 2 5 SIP 300 ------- 0 2.0.0.0 2.0.2.0 -1 501
v 145 eval {set sim_annotation {Registering alice8@vnet.com}}
s 145.000000000 _23_ AGT  --- 505 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 145.007551000 _14_ AGT  --- 505 SIP_REGISTER 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 145.007551000 _14_ AGT  --- 506 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 145.011395000 _23_ AGT  --- 506 SIP_407 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 145.011662000  23  AGT  --- 507 SIP REGISTER 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 145.015519000  14  AGT  --- 507 SIP REGISTER 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 145.015519000 _14_ AGT  --- 508 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 145.019703000 _23_ AGT  --- 508 SIP_200 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
v 146.12173999999999 eval {set sim_annotation {alice4@vnet.com starts session to bob2@homenet.com}}
s 146.121740000 _19_ AGT  --- 510 SIP_INVITE 800 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 146.129620000 _14_ AGT  --- 510 SIP_INVITE 820 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 146.129620000 _14_ AGT  --- 511 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
s 146.129620000  14  AGT  --- 512 SIP INVITE 800 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 146.12962 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
- 146.12962 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
r 146.133604000 _19_ AGT  --- 511 SIP_100 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
r 146.330202 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
+ 146.330202 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
- 146.330202 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
r 146.530522 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
+ 146.530522 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
- 146.530522 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
r 146.540586 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
+ 146.540586 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 513
- 146.540586 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 513
+ 146.540586 2 6 SIP 800 ------- 0 2.0.0.0 2.0.3.0 -1 514
- 146.540586 2 6 SIP 800 ------- 0 2.0.0.0 2.0.3.0 -1 514
r 146.550606 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 513
+ 146.550606 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 513
- 146.550606 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 513
r 146.55065 2 6 SIP 800 ------- 0 2.0.0.0 2.0.3.0 -1 514
+ 146.550917 6 2 SIP 550 ------- 0 2.0.3.0 2.0.0.0 -1 516
- 146.550917 6 2 SIP 550 ------- 0 2.0.3.0 2.0.0.0 -1 516
r 146.560961 6 2 SIP 550 ------- 0 2.0.3.0 2.0.0.0 -1 516
+ 146.560961 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
- 146.560961 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
r 146.571005 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
+ 146.571005 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
- 146.571005 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
s 146.629620000 _14_ AGT  --- 512 SIP_INVITE 800 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 146.62962 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
- 146.62962 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
r 146.750706 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 513
+ 146.750706 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 513
- 146.750706 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 513
r 146.771225 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
+ 146.771225 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
- 146.771225 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
r 146.830202 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
+ 146.830202 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
- 146.830202 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
r 146.950888 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 513
r 146.950887636  14  AGT  --- 513 SIP 100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 146.971625 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
r 146.971624818 _14_ AGT  --- 517 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 146.971624818 _14_ AGT  --- 520 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 146.977624818 _19_ AGT  --- 520 SIP_183 570 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 146.977891818 _19_ AGT  --- 521 SIP_PRACK 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 146.981971818 _14_ AGT  --- 521 SIP_PRACK 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 146.981971818 _14_ AGT  --- 522 SIP_PRACK 300 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 146.981972 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
- 146.981972 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
r 147.030522 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
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+ 147.030522 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
- 147.030522 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
r 147.040586 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 512
+ 147.040586 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
- 147.040586 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
r 147.05063 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
+ 147.05063 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
- 147.05063 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
+ 147.050917 6 2 SIP 550 ------- 0 2.0.3.0 2.0.0.0 -1 516
- 147.050917 6 2 SIP 550 ------- 0 2.0.3.0 2.0.0.0 -1 516
r 147.060961 6 2 SIP 550 ------- 0 2.0.3.0 2.0.0.0 -1 516
+ 147.060961 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 524
- 147.060961 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 524
r 147.071005 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 524
+ 147.071005 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 524
- 147.071005 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 524
r 147.18219 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
+ 147.18219 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
- 147.18219 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
r 147.25085 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
+ 147.25085 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
- 147.25085 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
r 147.271225 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 524
+ 147.271225 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 524
- 147.271225 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 524
r 147.38231 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
+ 147.38231 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
- 147.38231 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
r 147.392334 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
+ 147.392334 2 6 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 526
- 147.392334 2 6 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 526
r 147.402358 2 6 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 526
+ 147.402625 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 527
- 147.402625 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 527
+ 147.402625 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 528
- 147.402645 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 528
r 147.412645 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 527
+ 147.412645 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
- 147.412645 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
r 147.412665 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 528
+ 147.412665 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 530
- 147.412665 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 530
r 147.422665 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
+ 147.422665 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
- 147.422665 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
r 147.422685 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 530
+ 147.422685 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 530
- 147.422765 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 530
r 147.45125 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 517
r 147.451249818 _14_ AGT  --- 517 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 147.451249818 _14_ AGT  --- 531 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 147.457149818 _19_ AGT  --- 531 SIP_183 570 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
r 147.471625 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 524
r 147.471624818  14  AGT  --- 524 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 147.471624818 _14_ AGT  --- 532 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 147.477724818 _19_ AGT  --- 532 SIP_183 570 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 147.477891818 _19_ AGT  --- 521 SIP_PRACK 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
s 147.481971818 _14_ AGT  --- 522 SIP_PRACK 300 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 147.481972 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
- 147.481972 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
r 147.482188818  14  AGT  --- 521 SIP PRACK 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
r 147.622765 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
+ 147.622765 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
- 147.622765 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
r 147.622865 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 530
+ 147.622865 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 530
- 147.622947 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 530
r 147.68219 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
+ 147.68219 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
- 147.68219 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
r 147.822947 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
r 147.822946818  14  AGT  --- 529 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 147.822946818  14  AGT  --- 533 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 147.823129 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 530
r 147.823128636 _14_ AGT  --- 530 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 147.823128636 _14_ AGT  --- 534 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 147.826426818 _19_ AGT  --- 533 SIP_200 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
r 147.830550818 _19_ AGT  --- 534 SIP_180 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
r 147.88231 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
+ 147.88231 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
- 147.88231 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
r 147.892334 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 522
+ 147.892334 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
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- 147.892334 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
r 147.902354 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
+ 147.902354 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
- 147.902354 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
r 148.102454 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
+ 148.102454 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
- 148.102454 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
r 148.302636 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 529
r 148.302635818 _14_ AGT  --- 529 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
+ 148.500369 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 536
- 148.500369 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 536
r 148.510389 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 536
+ 148.510389 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
- 148.510389 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
r 148.520409 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
+ 148.520409 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
- 148.520409 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
r 148.720509 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
+ 148.720509 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
- 148.720509 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
r 148.920691 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 537
r 148.920691057 _14_ AGT  --- 537 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 148.920691057 _14_ AGT  --- 539 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 148.924591057 _19_ AGT  --- 539 SIP_200 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 148.924858057  19  AGT  --- 540 SIP ACK 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 148.928938057  14  AGT  --- 540 SIP ACK 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 148.928938057 _14_ AGT  --- 541 SIP_ACK 300 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 148.928938 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 541
- 148.928938 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 541
+ 149.000369 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 536
- 149.000369 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 536
r 149.010389 6 2 SIP 250 ------- 0 2.0.3.0 2.0.0.0 -1 536
+ 149.010389 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 542
- 149.010389 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 542
r 149.020409 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 542
+ 149.020409 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 542
- 149.020409 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 542
r 149.129156 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 541
+ 149.129156 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 541
- 149.129156 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 541
r 149.220509 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 542
+ 149.220509 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 542
- 149.220509 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 542
r 149.329276 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 541
+ 149.329276 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 541
- 149.329276 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 541
r 149.3393 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 541
+ 149.3393 2 6 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 543
- 149.3393 2 6 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 543
r 149.349324 2 6 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 543
v 149.350493 eval {set sim_annotation {alice6@vnet.com starts session to bob3@homenet.com}}
s 149.350493000 _21_ AGT  --- 544 SIP_INVITE 800 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 149.358493000  14  AGT  --- 544 SIP INVITE 820 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 149.358493000  14  AGT  --- 545 SIP 100 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
s 149.358493000 _14_ AGT  --- 546 SIP_INVITE 800 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 149.358493 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
- 149.358493 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
r 149.362737000 _21_ AGT  --- 545 SIP_100 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
r 149.420691 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 542
r 149.420691057 _14_ AGT  --- 542 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 149.420691057  14  AGT  --- 547 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 149.424391057  19  AGT  --- 547 SIP 200 270 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 149.424658057  19  AGT  --- 548 SIP ACK 300 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 149.428978057 _14_ AGT  --- 548 SIP_ACK 320 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 149.428978057 _14_ AGT  --- 549 SIP_ACK 300 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 149.428978 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 549
- 149.428978 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 549
r 149.559075 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
+ 149.559075 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
- 149.559075 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
r 149.629196 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 549
+ 149.629196 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 549
- 149.629196 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 549
r 149.759395 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
+ 149.759395 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
- 149.759395 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
r 149.769459 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
+ 149.769459 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 550
- 149.769459 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 550
+ 149.769459 2 7 SIP 800 ------- 0 2.0.0.0 2.0.4.0 -1 551
- 149.769459 2 7 SIP 800 ------- 0 2.0.0.0 2.0.4.0 -1 551
r 149.779479 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 550
+ 149.779479 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 550
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- 149.779479 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 550
r 149.779523 2 7 SIP 800 ------- 0 2.0.0.0 2.0.4.0 -1 551
+ 149.77979 7 2 SIP 550 ------- 0 2.0.4.0 2.0.0.0 -1 553
- 149.77979 7 2 SIP 550 ------- 0 2.0.4.0 2.0.0.0 -1 553
r 149.789834 7 2 SIP 550 ------- 0 2.0.4.0 2.0.0.0 -1 553
+ 149.789834 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
- 149.789834 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
r 149.799878 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
+ 149.799878 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
- 149.799878 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
r 149.829316 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 549
+ 149.829316 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 549
- 149.829316 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 549
r 149.83934 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 549
+ 149.83934 2 6 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 555
- 149.83934 2 6 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 555
r 149.849364 2 6 SIP 300 ------- 0 2.0.0.0 2.0.3.0 -1 555
s 149.858493000 _14_ AGT  --- 546 SIP_INVITE 800 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 149.858493 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
- 149.858493 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
r 149.979579 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 550
+ 149.979579 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 550
- 149.979579 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 550
r 150.000098 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
+ 150.000098 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
- 150.000098 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
r 150.059075 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
+ 150.059075 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
- 150.059075 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
r 150.179761 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 550
r 150.179760636 _14_ AGT  --- 550 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 150.200498 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
r 150.200497818  14  AGT  --- 554 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 150.200497818  14  AGT  --- 556 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 150.206517818  21  AGT  --- 556 SIP 183 570 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 150.206784818 _21_ AGT  --- 557 SIP_PRACK 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 150.210664818 _14_ AGT  --- 557 SIP_PRACK 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 150.210664818 _14_ AGT  --- 558 SIP_PRACK 300 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 150.210665 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
- 150.210665 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
r 150.259395 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
+ 150.259395 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
- 150.259395 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
r 150.269459 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 546
+ 150.269459 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
- 150.269459 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
r 150.279503 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
+ 150.279503 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
- 150.279503 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
+ 150.27979 7 2 SIP 550 ------- 0 2.0.4.0 2.0.0.0 -1 553
- 150.27979 7 2 SIP 550 ------- 0 2.0.4.0 2.0.0.0 -1 553
r 150.289834 7 2 SIP 550 ------- 0 2.0.4.0 2.0.0.0 -1 553
+ 150.289834 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 559
- 150.289834 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 559
r 150.299878 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 559
+ 150.299878 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 559
- 150.299878 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 559
r 150.410883 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
+ 150.410883 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
- 150.410883 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
r 150.479723 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
+ 150.479723 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
- 150.479723 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
r 150.500098 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 559
+ 150.500098 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 559
- 150.500098 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 559
r 150.611003 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
+ 150.611003 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
- 150.611003 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
r 150.621027 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
+ 150.621027 2 7 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 563
- 150.621027 2 7 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 563
r 150.631051 2 7 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 563
+ 150.631318 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 564
- 150.631318 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 564
+ 150.631318 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 565
- 150.631338 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 565
r 150.641338 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 564
+ 150.641338 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
- 150.641338 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
r 150.641358 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 565
+ 150.641358 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 567
- 150.641358 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 567
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r 150.651358 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
+ 150.651358 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
- 150.651358 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
r 150.651378 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 567
+ 150.651378 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 567
- 150.651458 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 567
r 150.680123 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 554
r 150.680122818 _14_ AGT  --- 554 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 150.680122818 _14_ AGT  --- 568 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 150.686502818 _21_ AGT  --- 568 SIP_183 570 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
r 150.700498 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 559
r 150.700497818 _14_ AGT  --- 559 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 150.700497818  14  AGT  --- 569 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 150.706777818  21  AGT  --- 569 SIP 183 570 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 150.706784818  21  AGT  --- 557 SIP PRACK 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
s 150.710664818 _14_ AGT  --- 558 SIP_PRACK 300 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 150.710665 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
- 150.710665 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
r 150.711001818 _14_ AGT  --- 557 SIP_PRACK 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
r 150.851458 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
+ 150.851458 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
- 150.851458 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
r 150.851558 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 567
+ 150.851558 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 567
- 150.85164 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 567
r 150.910883 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
+ 150.910883 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
- 150.910883 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
r 151.05164 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
r 151.051639818 _14_ AGT  --- 566 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 151.051639818 _14_ AGT  --- 571 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 151.051822 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 567
r 151.051821636  14  AGT  --- 567 SIP 180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 151.051821636  14  AGT  --- 572 SIP 180 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 151.055179818  21  AGT  --- 571 SIP 200 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
r 151.058923818 _21_ AGT  --- 572 SIP_180 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
r 151.111003 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
+ 151.111003 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
- 151.111003 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
r 151.121027 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 558
+ 151.121027 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
- 151.121027 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
r 151.131047 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
+ 151.131047 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
- 151.131047 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
r 151.331147 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
+ 151.331147 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
- 151.331147 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
r 151.531329 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 566
r 151.531328818 _14_ AGT  --- 566 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
+ 153.193202 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 576
- 153.193202 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 576
r 153.203222 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 576
+ 153.203222 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 577
- 153.203222 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 577
r 153.213242 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 577
+ 153.213242 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 577
- 153.213242 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 577
r 153.413342 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 577
+ 153.413342 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 577
- 153.413342 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 577
r 153.613523 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 577
r 153.613523379  14  AGT  --- 577 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 153.613523379 _14_ AGT  --- 580 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 153.617123379 _21_ AGT  --- 580 SIP_200 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 153.617390379 _21_ AGT  --- 581 SIP_ACK 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 153.621590379 _14_ AGT  --- 581 SIP_ACK 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 153.621590379 _14_ AGT  --- 582 SIP_ACK 300 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 153.62159 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 582
- 153.62159 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 582
+ 153.693202 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 576
- 153.693202 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 576
r 153.703222 7 2 SIP 250 ------- 0 2.0.4.0 2.0.0.0 -1 576
+ 153.703222 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 583
- 153.703222 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 583
r 153.713242 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 583
+ 153.713242 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 583
- 153.713242 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 583
r 153.821809 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 582
+ 153.821809 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 582
- 153.821809 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 582
r 153.913342 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 583
+ 153.913342 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 583
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- 153.913342 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 583
r 154.021929 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 582
+ 154.021929 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 582
- 154.021929 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 582
r 154.031953 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 582
+ 154.031953 2 7 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 586
- 154.031953 2 7 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 586
r 154.041977 2 7 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 586
r 154.113523 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 583
r 154.113523379 _14_ AGT  --- 583 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 154.113523379 _14_ AGT  --- 587 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 154.117183379 _21_ AGT  --- 587 SIP_200 270 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 154.117450379  21  AGT  --- 588 SIP ACK 300 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 154.121290379  14  AGT  --- 588 SIP ACK 320 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 154.121290379  14  AGT  --- 589 SIP ACK 300 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 154.12129 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 589
- 154.12129 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 589
r 154.321509 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 589
+ 154.321509 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 589
- 154.321509 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 589
r 154.521629 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 589
+ 154.521629 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 589
- 154.521629 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 589
r 154.531653 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 589
+ 154.531653 2 7 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 591
- 154.531653 2 7 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 591
r 154.541677 2 7 SIP 300 ------- 0 2.0.0.0 2.0.4.0 -1 591
v 155 eval {set sim_annotation {Registering alice10@vnet.com}}
s 155.000000000 _25_ AGT  --- 592 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 155.006891000 _14_ AGT  --- 592 SIP_REGISTER 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 155.006891000 _14_ AGT  --- 593 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 155.010795000 _25_ AGT  --- 593 SIP_407 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 155.011062000  25  AGT  --- 594 SIP REGISTER 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 155.015159000  14  AGT  --- 594 SIP REGISTER 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 155.015159000  14  AGT  --- 595 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 155.018903000 _25_ AGT  --- 595 SIP_200 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
v 157.095888 eval {set sim_annotation {sipbob(0)@homenet.com say bye to sipalice(0)@vnet.com (any side may
terminate the call)}}
+ 157.095888 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 598
- 157.095888 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 598
r 157.105912 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 598
+ 157.105912 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
- 157.105912 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
r 157.115936 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
+ 157.115936 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
- 157.115936 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
r 157.316056 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
+ 157.316056 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
- 157.316056 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
r 157.516274 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
r 157.516274182 _14_ AGT  --- 599 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 157.516274182 _14_ AGT  --- 600 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.1:0 32 0]
r 157.520454182  15  AGT  --- 600 SIP BYE 320 [13a 1 0 800] ------- [1.0.0:0 1.0.1:0 32 1.0.1]
s 157.520721182  15  AGT  --- 601 SIP 200 250 [0 0 0 0] ------- [1.0.1:0 1.0.0:0 32 0]
r 157.524541182 _14_ AGT  --- 601 SIP_200 270 [13a 0 1 800] ------- [1.0.1:0 1.0.0:0 32 1.0.0]
s 157.524541182 _14_ AGT  --- 602 SIP_200 250 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 157.524541 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
- 157.524541 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
+ 157.595888 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 598
- 157.595888 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 598
+ 157.605912 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
- 157.605912 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
r 157.605912 4 2 SIP 300 ------- 0 2.0.1.0 2.0.0.0 -1 598
r 157.615936 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
+ 157.615936 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
- 157.615936 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
r 157.724723 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
+ 157.724723 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
- 157.724723 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
r 157.816056 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
+ 157.816056 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
- 157.816056 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
r 157.924823 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
+ 157.924823 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
- 157.924823 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
r 157.934843 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
+ 157.934843 2 4 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 603
- 157.934843 2 4 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 603
r 157.944863 2 4 SIP 250 ------- 0 2.0.0.0 2.0.1.0 -1 603
r 158.016274 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 599
r 158.016274182  14  AGT  --- 599 SIP BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 158.016274182  14  AGT  --- 602 SIP 200 250 [13a 0 1 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 158.016274 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
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- 158.016274 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
r 158.216456 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
+ 158.216456 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
- 158.216456 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
r 158.416556 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
+ 158.416556 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
- 158.416556 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
r 158.426576 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 602
v 164.40281999999999 eval {set sim_annotation {alice8@vnet.com starts session to bob4@homenet.com}}
s 164.402820000 _23_ AGT  --- 616 SIP_INVITE 800 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 164.410640000 _14_ AGT  --- 616 SIP_INVITE 820 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 164.410640000 _14_ AGT  --- 617 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
s 164.410640000  14  AGT  --- 618 SIP INVITE 800 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 164.41064 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
- 164.41064 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
r 164.414644000 _23_ AGT  --- 617 SIP_100 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
r 164.611222 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
+ 164.611222 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
- 164.611222 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
r 164.811542 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
+ 164.811542 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
- 164.811542 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
r 164.821606 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
+ 164.821606 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 619
- 164.821606 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 619
+ 164.821606 2 8 SIP 800 ------- 0 2.0.0.0 2.0.5.0 -1 620
- 164.821606 2 8 SIP 800 ------- 0 2.0.0.0 2.0.5.0 -1 620
r 164.831626 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 619
+ 164.831626 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 619
- 164.831626 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 619
r 164.83167 2 8 SIP 800 ------- 0 2.0.0.0 2.0.5.0 -1 620
+ 164.831937 8 2 SIP 550 ------- 0 2.0.5.0 2.0.0.0 -1 622
- 164.831937 8 2 SIP 550 ------- 0 2.0.5.0 2.0.0.0 -1 622
r 164.841981 8 2 SIP 550 ------- 0 2.0.5.0 2.0.0.0 -1 622
+ 164.841981 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
- 164.841981 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
r 164.852025 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
+ 164.852025 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
- 164.852025 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
s 164.910640000 _14_ AGT  --- 618 SIP_INVITE 800 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 164.91064 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
- 164.91064 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
v 165 eval {set sim annotation {Registering alice12@vnet.com}}
s 165.000000000 _27_ AGT  --- 624 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 165.006731000 _14_ AGT  --- 624 SIP_REGISTER 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 165.006731000 _14_ AGT  --- 625 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 165.010875000 _27_ AGT  --- 625 SIP_407 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 165.011142000 _27_ AGT  --- 626 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 165.014962000 _14_ AGT  --- 626 SIP_REGISTER 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 165.014962000 _14_ AGT  --- 627 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 165.018866000 _27_ AGT  --- 627 SIP_200 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
r 165.031726 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 619
+ 165.031726 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 619
- 165.031726 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 619
r 165.052245 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
+ 165.052245 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
- 165.052245 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
r 165.111222 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
+ 165.111222 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
- 165.111222 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
r 165.231908 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 619
r 165.231907636  14  AGT  --- 619 SIP 100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 165.252645 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
r 165.252644818 _14_ AGT  --- 623 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 165.252644818 _14_ AGT  --- 630 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 165.258724818 _23_ AGT  --- 630 SIP_183 570 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 165.258991818 _23_ AGT  --- 631 SIP_PRACK 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 165.263111818 _14_ AGT  --- 631 SIP_PRACK 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 165.263111818  14  AGT  --- 632 SIP PRACK 300 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 165.263112 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
- 165.263112 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
r 165.311542 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
+ 165.311542 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
- 165.311542 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
r 165.321606 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 618
+ 165.321606 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
- 165.321606 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
r 165.33165 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
+ 165.33165 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
- 165.33165 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
+ 165.331937 8 2 SIP 550 ------- 0 2.0.5.0 2.0.0.0 -1 622
- 165.331937 8 2 SIP 550 ------- 0 2.0.5.0 2.0.0.0 -1 622
r 165.341981 8 2 SIP 550 ------- 0 2.0.5.0 2.0.0.0 -1 622
```

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+ 165.341981 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 633
- 165.341981 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 633
r 165.352025 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 633
+ 165.352025 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 633
- 165.352025 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 633
r 165.46333 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
+ 165.46333 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
- 165.46333 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
r 165.53187 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
+ 165.53187 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
- 165.53187 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
r 165.552245 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 633
+ 165.552245 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 633
- 165.552245 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 633
r 165.66345 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
+ 165.66345 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
- 165.66345 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
r 165.673474 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
+ 165.673474 2 8 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 634
- 165.673474 2 8 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 634
r 165.683498 2 8 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 634
+ 165.683765 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 635
- 165.683765 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 635
+ 165.683765 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 636
- 165.683785 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 636
r 165.693785 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 635
+ 165.693785 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
- 165.693785 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
r 165.693805 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 636
+ 165.693805 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 638
- 165.693805 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 638
r 165.703805 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
+ 165.703805 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
- 165.703805 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
r 165.703825 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 638
+ 165.703825 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 638
- 165.703905 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 638
r 165.73227 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 623
r 165.732269818 _14_ AGT  --- 623 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 165.732269818 _14_ AGT  --- 639 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 165.738349818  23  AGT  --- 639 SIP 183 570 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
r 165.752645 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 633
r 165.752644818  14  AGT  --- 633 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 165.752644818 _14_ AGT  --- 640 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 165.758524818 _23_ AGT  --- 640 SIP_183 570 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 165.758991818 _23_ AGT  --- 631 SIP_PRACK 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
s 165.763111818 _14_ AGT  --- 632 SIP_PRACK 300 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 165.763112 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
- 165.763112 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
r 165.763251818 _14_ AGT  --- 631 SIP_PRACK 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
r 165.903905 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
+ 165.903905 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
- 165.903905 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
r 165.904005 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 638
+ 165.904005 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 638
- 165.904087 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 638
r 165.96333 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
+ 165.96333 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
- 165.96333 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
r 166.104087 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
r 166.104086818  14  AGT  --- 637 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 166.104086818  14  AGT  --- 641 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 166.104269 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 638
r 166.104268636 _14_ AGT  --- 638 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 166.104268636 _14_ AGT  --- 642 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 166.107726818 _23_ AGT  --- 641 SIP_200 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
r 166.111550818 _23_ AGT  --- 642 SIP_180 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
r 166.16345 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
+ 166.16345 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
- 166.16345 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
r 166.173474 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 632
+ 166.173474 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
- 166.173474 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
r 166.183494 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
+ 166.183494 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
- 166.183494 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
r 166.383594 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
+ 166.383594 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
- 166.383594 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
r 166.583776 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 637
r 166.583775818  14  AGT  --- 637 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
+ 168.347187 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 648
- 168.347187 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 648
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r 168.357207 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 648
+ 168.357207 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 649
- 168.357207 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 649
r 168.367227 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 649
+ 168.367227 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 649
- 168.367227 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 649
r 168.567327 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 649
+ 168.567327 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 649
- 168.567327 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 649
r 168.767509 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 649
r 168.767508920 _14_ AGT  --- 649 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 168.767508920 _14_ AGT  --- 650 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 168.771108920  23  AGT  --- 650 SIP 200 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 168.771375920  23  AGT  --- 651 SIP ACK 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 168.775255920  14  AGT  --- 651 SIP ACK 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 168.775255920 _14_ AGT  --- 652 SIP_ACK 300 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 168.775256 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 652
- 168.775256 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 652
+ 168.847187 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 648
- 168.847187 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 648
r 168.857207 8 2 SIP 250 ------- 0 2.0.5.0 2.0.0.0 -1 648
+ 168.857207 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
- 168.857207 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
r 168.867227 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
+ 168.867227 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
- 168.867227 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
r 168.975474 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 652
+ 168.975474 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 652
- 168.975474 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 652
r 169.067327 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
+ 169.067327 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
- 169.067327 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
r 169.175594 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 652
+ 169.175594 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 652
- 169.175594 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 652
r 169.185618 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 652
+ 169.185618 2 8 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 655
- 169.185618 2 8 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 655
r 169.195642 2 8 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 655
r 169.267509 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 653
r 169.267508920  14  AGT  --- 653 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 169.267508920  14  AGT  --- 656 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 169.271488920  23  AGT  --- 656 SIP 200 270 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 169.271755920 _23_ AGT  --- 657 SIP_ACK 300 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 169.275935920 _14_ AGT  --- 657 SIP_ACK 320 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 169.275935920 _14_ AGT  --- 658 SIP_ACK 300 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 169.275936 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 658
- 169.275936 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 658
r 169.476154 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 658
+ 169.476154 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 658
- 169.476154 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 658
r 169.676274 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 658
+ 169.676274 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 658
- 169.676274 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 658
r 169.686298 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 658
+ 169.686298 2 8 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 659
- 169.686298 2 8 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 659
r 169.696322 2 8 SIP 300 ------- 0 2.0.0.0 2.0.5.0 -1 659
v 175 eval {set sim_annotation {Registering alice14@vnet.com}}
s 175.000000000 _29_ AGT  --- 668 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 175.007191000  14  AGT  --- 668 SIP REGISTER 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 175.007191000  14  AGT  --- 669 SIP 407 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 175.011015000  29  AGT  --- 669 SIP 407 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 175.011282000 _29_ AGT  --- 670 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 175.015459000 _14_ AGT  --- 670 SIP_REGISTER 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 175.015459000 _14_ AGT  --- 671 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 175.019363000 _29_ AGT  --- 671 SIP_200 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
v 179.02224999999999 eval {set sim_annotation {alice10@vnet.com starts session to bob5@homenet.com}}
s 179.022250000  25  AGT  --- 679 SIP INVITE 800 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 179.030230000 _14_ AGT  --- 679 SIP_INVITE 820 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 179.030230000 _14_ AGT  --- 680 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
s 179.030230000  14  AGT  --- 681 SIP INVITE 800 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 179.03023 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
- 179.03023 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
r 179.033914000 _25_ AGT  --- 680 SIP_100 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
r 179.230812 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
+ 179.230812 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
- 179.230812 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
r 179.431132 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
+ 179.431132 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
- 179.431132 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
r 179.441196 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
+ 179.441196 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 683
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- 179.441196 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 683
+ 179.441196 2 9 SIP 800 ------- 0 2.0.0.0 2.0.6.0 -1 684
- 179.441196 2 9 SIP 800 ------- 0 2.0.0.0 2.0.6.0 -1 684
r 179.451216 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 683
+ 179.451216 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 683
- 179.451216 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 683
r 179.45126 2 9 SIP 800 ------- 0 2.0.0.0 2.0.6.0 -1 684
+ 179.451527 9 2 SIP 550 ------- 0 2.0.6.0 2.0.0.0 -1 686
- 179.451527 9 2 SIP 550 ------- 0 2.0.6.0 2.0.0.0 -1 686
r 179.461571 9 2 SIP 550 ------- 0 2.0.6.0 2.0.0.0 -1 686
+ 179.461571 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
- 179.461571 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
r 179.471615 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
+ 179.471615 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
- 179.471615 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
s 179.530230000 _14_ AGT  --- 681 SIP_INVITE 800 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 179.53023 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
- 179.53023 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
r 179.651316 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 683
+ 179.651316 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 683
- 179.651316 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 683
r 179.671835 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
+ 179.671835 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
- 179.671835 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
r 179.730812 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
+ 179.730812 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
- 179.730812 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
r 179.851498 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 683
r 179.851497636 _14_ AGT  --- 683 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 179.872235 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
r 179.872234818 _14_ AGT  --- 687 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 179.872234818 _14_ AGT  --- 688 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 179.878574818  25  AGT  --- 688 SIP 183 570 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 179.878841818  25  AGT  --- 689 SIP PRACK 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 179.882981818  14  AGT  --- 689 SIP PRACK 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 179.882981818 _14_ AGT  --- 690 SIP_PRACK 300 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 179.882982 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
- 179.882982 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
r 179.931132 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
+ 179.931132 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
- 179.931132 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
r 179.941196 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 681
+ 179.941196 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
- 179.941196 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
r 179.95124 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
+ 179.95124 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
- 179.95124 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
+ 179.951527 9 2 SIP 550 ------- 0 2.0.6.0 2.0.0.0 -1 686
- 179.951527 9 2 SIP 550 ------- 0 2.0.6.0 2.0.0.0 -1 686
r 179.961571 9 2 SIP 550 ------- 0 2.0.6.0 2.0.0.0 -1 686
+ 179.961571 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 691
- 179.961571 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 691
r 179.971615 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 691
+ 179.971615 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 691
- 179.971615 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 691
r 180.0832 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
+ 180.0832 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
- 180.0832 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
r 180.15146 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
+ 180.15146 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
- 180.15146 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
r 180.171835 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 691
+ 180.171835 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 691
- 180.171835 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 691
r 180.28332 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
+ 180.28332 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
- 180.28332 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
r 180.293344 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
+ 180.293344 2 9 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 692
- 180.293344 2 9 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 692
r 180.303368 2 9 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 692
+ 180.303635 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 693
- 180.303635 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 693
+ 180.303635 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 694
- 180.303655 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 694
r 180.313655 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 693
+ 180.313655 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
- 180.313655 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
r 180.313675 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 694
+ 180.313675 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 696
- 180.313675 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 696
r 180.323675 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
+ 180.323675 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
```

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- 180.323675 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
r 180.323695 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 696
+ 180.323695 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 696
- 180.323775 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 696
r 180.35186 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 687
r 180.351859818  14  AGT  --- 687 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 180.351859818  14  AGT  --- 697 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 180.357959818 _25_ AGT  --- 697 SIP_183 570 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
r 180.372235 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 691
r 180.372234818 _14_ AGT  --- 691 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 180.372234818 _14_ AGT  --- 698 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 180.378534818 _25_ AGT  --- 698 SIP_183 570 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 180.378841818  25  AGT  --- 689 SIP PRACK 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 180.382941818  14  AGT  --- 689 SIP PRACK 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 180.382981818  14  AGT  --- 690 SIP PRACK 300 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 180.382982 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
- 180.382982 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
r 180.523775 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
+ 180.523775 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
- 180.523775 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
r 180.523875 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 696
+ 180.523875 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 696
- 180.523957 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 696
r 180.5832 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
+ 180.5832 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
- 180.5832 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
r 180.723957 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
r 180.723956818 _14_ AGT  --- 695 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 180.723956818 _14_ AGT  --- 700 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 180.724139 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 696
r 180.724138636 _14_ AGT  --- 696 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 180.724138636 _14_ AGT  --- 701 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 180.727536818  25  AGT  --- 700 SIP 200 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
r 180.731260818  25  AGT  --- 701 SIP 180 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
r 180.78332 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
+ 180.78332 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
- 180.78332 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
r 180.793344 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 690
+ 180.793344 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
- 180.793344 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
r 180.803364 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
+ 180.803364 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
- 180.803364 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
v 180.83897999999999 eval {set sim_annotation {sipbob(1)@homenet.com say bye to sipalice(2)@vnet.com (any side
may terminate the call)}}
+ 180.83898 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 702
- 180.83898 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 702
r 180.849004 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 702
+ 180.849004 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
- 180.849004 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
r 180.859028 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
+ 180.859028 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
- 180.859028 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
r 181.003464 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
+ 181.003464 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
- 181.003464 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
r 181.059148 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
+ 181.059148 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
- 181.059148 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
r 181.203646 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 695
r 181.203645818  14  AGT  --- 695 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 181.259366 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
r 181.259366182  14  AGT  --- 703 SIP BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 181.259366182 _14_ AGT  --- 706 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.3:0 32 0]
r 181.263426182 _17_ AGT  --- 706 SIP_BYE 320 [13a 3 0 800] ------- [1.0.0:0 1.0.3:0 32 1.0.3]
s 181.263693182 _17_ AGT  --- 707 SIP_200 250 [0 0 0 0] ------- [1.0.3:0 1.0.0:0 32 0]
r 181.267393182 _14_ AGT  --- 707 SIP_200 270 [13a 0 3 800] ------- [1.0.3:0 1.0.0:0 32 1.0.0]
s 181.267393182 _14_ AGT  --- 708 SIP_200 250 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 181.267393 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
- 181.267393 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
+ 181.33898 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 702
- 181.33898 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 702
+ 181.349004 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
- 181.349004 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
r 181.349004 5 2 SIP 300 ------- 0 2.0.2.0 2.0.0.0 -1 702
r 181.359028 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
+ 181.359028 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
- 181.359028 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
r 181.467575 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
+ 181.467575 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
- 181.467575 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
r 181.559148 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
+ 181.559148 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
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- 181.559148 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
r 181.667675 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
+ 181.667675 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
- 181.667675 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
r 181.677695 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
+ 181.677695 2 5 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 710
- 181.677695 2 5 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 710
r 181.687715 2 5 SIP 250 ------- 0 2.0.0.0 2.0.2.0 -1 710
r 181.759366 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 703
r 181.759366182 _14_ AGT  --- 703 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 181.759366182 _14_ AGT  --- 708 SIP_200 250 [13a 0 3 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 181.759366 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
- 181.759366 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
r 181.959548 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
+ 181.959548 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
- 181.959548 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
r 182.159648 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
+ 182.159648 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
- 182.159648 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
r 182.169668 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 708
+ 182.925082 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 712
- 182.925082 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 712
r 182.935102 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 712
+ 182.935102 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 713
- 182.935102 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 713
r 182.945122 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 713
+ 182.945122 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 713
- 182.945122 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 713
r 183.145222 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 713
+ 183.145222 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 713
- 183.145222 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 713
r 183.345404 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 713
r 183.345403936  14  AGT  --- 713 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 183.345403936  14  AGT  --- 714 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 183.349203936  25  AGT  --- 714 SIP 200 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 183.349470936 _25_ AGT  --- 715 SIP_ACK 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 183.353850936 _14_ AGT  --- 715 SIP_ACK 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 183.353850936 _14_ AGT  --- 716 SIP_ACK 300 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 183.353851 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 716
- 183.353851 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 716
+ 183.425082 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 712
- 183.425082 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 712
r 183.435102 9 2 SIP 250 ------- 0 2.0.6.0 2.0.0.0 -1 712
+ 183.435102 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 717
- 183.435102 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 717
r 183.445122 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 717
+ 183.445122 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 717
- 183.445122 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 717
r 183.554069 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 716
+ 183.554069 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 716
- 183.554069 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 716
r 183.645222 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 717
+ 183.645222 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 717
- 183.645222 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 717
r 183.754189 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 716
+ 183.754189 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 716
- 183.754189 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 716
r 183.764213 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 716
+ 183.764213 2 9 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 719
- 183.764213 2 9 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 719
r 183.774237 2 9 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 719
r 183.845404 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 717
r 183.845403936  14  AGT  --- 717 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 183.845403936 _14_ AGT  --- 721 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 183.848843936 _25_ AGT  --- 721 SIP_200 270 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 183.849110936 _25_ AGT  --- 722 SIP_ACK 300 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 183.853230936 _14_ AGT  --- 722 SIP_ACK 320 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 183.853230936 _14_ AGT  --- 723 SIP_ACK 300 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 183.853231 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 723
- 183.853231 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 723
r 184.053449 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 723
+ 184.053449 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 723
- 184.053449 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 723
r 184.253569 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 723
+ 184.253569 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 723
- 184.253569 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 723
r 184.263593 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 723
+ 184.263593 2 9 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 724
- 184.263593 2 9 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 724
r 184.273617 2 9 SIP 300 ------- 0 2.0.0.0 2.0.6.0 -1 724
v 185 eval {set sim annotation {Registering alice16@vnet.com}}
s 185.000000000  31  AGT  --- 726 SIP REGISTER 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 185.007391000 _14_ AGT  --- 726 SIP_REGISTER 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
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s 185.007391000 _14_ AGT  --- 728 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 185.013717000 _31_ AGT  --- 728 SIP_407 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 185.013984000 _31_ AGT  --- 729 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 185.017881000 _14_ AGT  --- 729 SIP_REGISTER 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 185.017881000  14  AGT  --- 730 SIP 200 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 185.021665000  31  AGT  --- 730 SIP 200 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
v 188.56644 eval {set sim annotation {alice12@vnet.com starts session to bob6@homenet.com}}
s 188.566440000 _27_ AGT  --- 735 SIP_INVITE 800 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 188.574240000 _14_ AGT  --- 735 SIP_INVITE 820 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 188.574240000 _14_ AGT  --- 736 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
s 188.574240000 _14_ AGT  --- 737 SIP_INVITE 800 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 188.57424 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
- 188.57424 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
r 188.578224000  27  AGT  --- 736 SIP 100 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
r 188.774822 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
+ 188.774822 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
- 188.774822 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
r 188.975142 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
+ 188.975142 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
- 188.975142 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
r 188.985206 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
+ 188.985206 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 739
- 188.985206 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 739
+ 188.985206 2 10 SIP 800 ------- 0 2.0.0.0 2.0.7.0 -1 740
- 188.985206 2 10 SIP 800 ------- 0 2.0.0.0 2.0.7.0 -1 740
r 188.995226 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 739
+ 188.995226 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 739
- 188.995226 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 739
r 188.99527 2 10 SIP 800 ------- 0 2.0.0.0 2.0.7.0 -1 740
+ 188.995537 10 2 SIP 550 ------- 0 2.0.7.0 2.0.0.0 -1 742
- 188.995537 10 2 SIP 550 ------- 0 2.0.7.0 2.0.0.0 -1 742
r 189.005581 10 2 SIP 550 ------- 0 2.0.7.0 2.0.0.0 -1 742
+ 189.005581 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
- 189.005581 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
r 189.015625 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
+ 189.015625 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
- 189.015625 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
s 189.074240000 _14_ AGT  --- 737 SIP_INVITE 800 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 189.07424 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
- 189.07424 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
r 189.195326 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 739
+ 189.195326 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 739
- 189.195326 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 739
r 189.215845 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
+ 189.215845 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
- 189.215845 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
r 189.274822 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
+ 189.274822 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
- 189.274822 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
r 189.395508 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 739
r 189.395507636 _14_ AGT  --- 739 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 189.416245 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
r 189.416244818  14  AGT  --- 743 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 189.416244818  14  AGT  --- 744 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 189.422604818 _27_ AGT  --- 744 SIP_183 570 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 189.422871818 _27_ AGT  --- 745 SIP_PRACK 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 189.427251818 _14_ AGT  --- 745 SIP_PRACK 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 189.427251818 _14_ AGT  --- 746 SIP_PRACK 300 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 189.427252 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
- 189.427252 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
r 189.475142 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
+ 189.475142 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
- 189.475142 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
r 189.485206 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 737
+ 189.485206 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
- 189.485206 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
r 189.49525 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
+ 189.49525 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
- 189.49525 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
+ 189.495537 10 2 SIP 550 ------- 0 2.0.7.0 2.0.0.0 -1 742
- 189.495537 10 2 SIP 550 ------- 0 2.0.7.0 2.0.0.0 -1 742
r 189.505581 10 2 SIP 550 ------- 0 2.0.7.0 2.0.0.0 -1 742
+ 189.505581 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 748
- 189.505581 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 748
r 189.515625 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 748
+ 189.515625 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 748
- 189.515625 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 748
r 189.62747 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
+ 189.62747 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
- 189.62747 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
r 189.69547 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
+ 189.69547 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
- 189.69547 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
```

```
r 189.715845 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 748
+ 189.715845 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 748
- 189.715845 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 748
r 189.82759 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
+ 189.82759 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
- 189.82759 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
r 189.837614 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
+ 189.837614 2 10 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 751
- 189.837614 2 10 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 751
r 189.847638 2 10 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 751
+ 189.847905 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 752
- 189.847905 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 752
+ 189.847905 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 753
- 189.847925 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 753
r 189.857925 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 752
+ 189.857925 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
- 189.857925 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
r 189.857945 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 753
+ 189.857945 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 755
- 189.857945 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 755
r 189.867945 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
+ 189.867945 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
- 189.867945 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
r 189.867965 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 755
+ 189.867965 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 755
- 189.868045 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 755
r 189.89587 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 743
r 189.895869818 _14_ AGT  --- 743 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 189.895869818 _14_ AGT  --- 756 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 189.901969818 _27_ AGT  --- 756 SIP_183 570 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
r 189.916245 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 748
r 189.916244818 _14_ AGT  --- 748 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 189.916244818  14  AGT  --- 757 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 189.922044818  27  AGT  --- 757 SIP 183 570 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 189.922871818  27  AGT  --- 745 SIP PRACK 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 189.926851818 _14_ AGT  --- 745 SIP_PRACK 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 189.927251818 _14_ AGT  --- 746 SIP_PRACK 300 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 189.927252 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
- 189.927252 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
r 190.068045 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
+ 190.068045 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
- 190.068045 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
r 190.068145 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 755
+ 190.068145 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 755
- 190.068227 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 755
r 190.12747 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
+ 190.12747 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
- 190.12747 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
r 190.268227 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
r 190.268226818 _14_ AGT  --- 754 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 190.268226818 _14_ AGT  --- 758 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 190.268409 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 755
r 190.268408636  14  AGT  --- 755 SIP 180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 190.268408636  14  AGT  --- 759 SIP 180 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 190.272146818 _27_ AGT  --- 758 SIP_200 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
r 190.276150818 _27_ AGT  --- 759 SIP_180 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
r 190.32759 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
+ 190.32759 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
- 190.32759 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
r 190.337614 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 746
+ 190.337614 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
- 190.337614 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
r 190.347634 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
+ 190.347634 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
- 190.347634 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
r 190.547734 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
+ 190.547734 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
- 190.547734 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
r 190.747916 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 754
r 190.747915818 _14_ AGT  --- 754 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
+ 190.900693 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 762
- 190.900693 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 762
r 190.910713 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 762
+ 190.910713 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 763
- 190.910713 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 763
r 190.920733 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 763
+ 190.920733 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 763
- 190.920733 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 763
r 191.120833 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 763
+ 191.120833 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 763
- 191.120833 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 763
v 191.12173999999999 eval {set sim annotation {sipbob(2)@homenet.com say bye to sipalice(4)@vnet.com (any side
may terminate the call)}}
```

```
+ 191.12174 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 765
- 191.12174 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 765
r 191.131764 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 765
+ 191.131764 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
- 191.131764 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
r 191.141788 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
+ 191.141788 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
- 191.141788 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
r 191.321015 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 763
r 191.321014818 _14_ AGT  --- 763 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 191.321014818 _14_ AGT  --- 767 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 191.324854818 _27_ AGT  --- 767 SIP_200 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 191.325121818  27  AGT  --- 768 SIP ACK 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 191.329141818  14  AGT  --- 768 SIP ACK 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 191.329141818  14  AGT  --- 769 SIP ACK 300 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 191.329142 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 769
- 191.329142 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 769
r 191.341908 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
+ 191.341908 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
- 191.341908 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
+ 191.400693 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 762
- 191.400693 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 762
r 191.410713 10 2 SIP 250 ------- 0 2.0.7.0 2.0.0.0 -1 762
+ 191.410713 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
- 191.410713 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
r 191.420733 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
+ 191.420733 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
- 191.420733 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
r 191.52936 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 769
+ 191.52936 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 769
- 191.52936 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 769
r 191.542126 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
r 191.542126182  14  AGT  --- 766 SIP BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 191.542126182  14  AGT  --- 771 SIP BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.5:0 32 0]
r 191.545966182  19  AGT  --- 771 SIP BYE 320 [13a 5 0 800] ------- [1.0.0:0 1.0.5:0 32 1.0.5]
s 191.546233182 _19_ AGT  --- 772 SIP_200 250 [0 0 0 0] ------- [1.0.5:0 1.0.0:0 32 0]
r 191.550213182 _14_ AGT  --- 772 SIP_200 270 [13a 0 5 800] ------- [1.0.5:0 1.0.0:0 32 1.0.0]
s 191.550213182 _14_ AGT  --- 773 SIP_200 250 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 191.550213 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
- 191.550213 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
r 191.620833 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
+ 191.620833 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
- 191.620833 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
+ 191.62174 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 765
- 191.62174 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 765
+ 191.631764 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
- 191.631764 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
r 191.631764 6 2 SIP 300 ------- 0 2.0.3.0 2.0.0.0 -1 765
r 191.641788 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
+ 191.641788 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
- 191.641788 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
r 191.72948 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 769
+ 191.72948 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 769
- 191.72948 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 769
r 191.739504 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 769
+ 191.739504 2 10 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 775
- 191.739504 2 10 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 775
r 191.749528 2 10 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 775
r 191.750395 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
+ 191.750395 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
- 191.750395 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
r 191.821015 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 770
r 191.821014818  14  AGT  --- 770 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 191.821014818 _14_ AGT  --- 776 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 191.824534818 _27_ AGT  --- 776 SIP_200 270 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 191.824801818 _27_ AGT  --- 777 SIP_ACK 300 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 191.828821818 _14_ AGT  --- 777 SIP_ACK 320 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 191.828821818 _14_ AGT  --- 778 SIP_ACK 300 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 191.828822 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 778
- 191.828822 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 778
r 191.841908 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
+ 191.841908 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
- 191.841908 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
r 191.950495 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
+ 191.950495 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
- 191.950495 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
r 191.960515 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
+ 191.960515 2 6 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 779
- 191.960515 2 6 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 779
r 191.970535 2 6 SIP 250 ------- 0 2.0.0.0 2.0.3.0 -1 779
r 192.02904 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 778
+ 192.02904 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 778
- 192.02904 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 778
```

```
r 192.042126 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 766
r 192.042126182 _14_ AGT  --- 766 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 192.042126182 _14_ AGT  --- 773 SIP_200 250 [13a 0 5 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 192.042126 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
- 192.042126 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
r 192.22916 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 778
+ 192.22916 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 778
- 192.22916 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 778
r 192.239184 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 778
+ 192.239184 2 10 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 780
- 192.239184 2 10 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 780
r 192.242308 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
+ 192.242308 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
- 192.242308 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
r 192.249208 2 10 SIP 300 ------- 0 2.0.0.0 2.0.7.0 -1 780
r 192.442408 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
+ 192.442408 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
- 192.442408 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
r 192.452428 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 773
v 194.350493 eval {set sim_annotation {sipbob(3)@homenet.com say bye to sipalice(6)@vnet.com (any side may
terminate the call)}}
+ 194.350493 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 784
- 194.350493 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 784
r 194.360517 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 784
+ 194.360517 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
- 194.360517 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 194.370541 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
+ 194.370541 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
- 194.370541 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 194.570661 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
+ 194.570661 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
- 194.570661 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 194.770879 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 194.770879182  14  AGT  --- 785 SIP BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 194.770879182  14  AGT  --- 786 SIP BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.7:0 32 0]
r 194.774779182 _21_ AGT  --- 786 SIP_BYE 320 [13a 7 0 800] ------- [1.0.0:0 1.0.7:0 32 1.0.7]
s 194.775046182 _21_ AGT  --- 787 SIP_200 250 [0 0 0 0] ------- [1.0.7:0 1.0.0:0 32 0]
r 194.778686182 _14_ AGT  --- 787 SIP_200 270 [13a 0 7 800] ------- [1.0.7:0 1.0.0:0 32 1.0.0]
s 194.778686182 _14_ AGT  --- 788 SIP_200 250 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 194.778686 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
- 194.778686 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
+ 194.850493 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 784
- 194.850493 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 784
+ 194.860517 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
- 194.860517 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 194.860517 7 2 SIP 300 ------- 0 2.0.4.0 2.0.0.0 -1 784
r 194.870541 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
+ 194.870541 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
- 194.870541 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 194.978868 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
+ 194.978868 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
- 194.978868 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
v 195 eval {set sim annotation {Registering alice18@vnet.com}}
s 195.000000000  33  AGT  --- 789 SIP REGISTER 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 195.007551000 _14_ AGT  --- 789 SIP_REGISTER 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 195.007551000 _14_ AGT  --- 790 SIP_407 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 195.011615000 _33_ AGT  --- 790 SIP_407 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 195.011882000 _33_ AGT  --- 791 SIP_REGISTER 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 195.015782000 _14_ AGT  --- 791 SIP_REGISTER 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 195.015782000 _14_ AGT  --- 792 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 195.019526000  33  AGT  --- 792 SIP 200 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
r 195.070661 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
+ 195.070661 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
- 195.070661 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 195.178968 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
+ 195.178968 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
- 195.178968 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
r 195.188988 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
+ 195.188988 2 7 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 793
- 195.188988 2 7 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 793
r 195.199008 2 7 SIP 250 ------- 0 2.0.0.0 2.0.4.0 -1 793
r 195.270879 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 785
r 195.270879182  14  AGT  --- 785 SIP BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 195.270879182  14  AGT  --- 788 SIP 200 250 [13a 0 7 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 195.270879 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
- 195.270879 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
r 195.471061 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
+ 195.471061 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
- 195.471061 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
r 195.671161 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
+ 195.671161 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
- 195.671161 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
r 195.681181 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 788
```

```
v 200.01676899 eval {set sim_annotation {alice18@vnet.com starts session to bob9@homenet.com}}
s 200.016768990 _33_ AGT  --- 802 SIP_INVITE 800 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 200.025088990 _14_ AGT  --- 802 SIP_INVITE 820 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 200.025088990 _14_ AGT  --- 803 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
s 200.025088990  14  AGT  --- 804 SIP INVITE 800 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 200.025089 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
- 200.025089 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
r 200.028932990 _33_ AGT  --- 803 SIP_100 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
r 200.225671 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
+ 200.225671 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
- 200.225671 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
r 200.425991 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
+ 200.425991 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
- 200.425991 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
r 200.436055 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
+ 200.436055 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 806
- 200.436055 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 806
+ 200.436055 2 13 SIP 800 ------- 0 2.0.0.0 2.0.10.0 -1 807
- 200.436055 2 13 SIP 800 ------- 0 2.0.0.0 2.0.10.0 -1 807
r 200.446075 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 806
+ 200.446075 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 806
- 200.446075 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 806
r 200.446119 2 13 SIP 800 ------- 0 2.0.0.0 2.0.10.0 -1 807
+ 200.446386 13 2 SIP 550 ------- 0 2.0.10.0 2.0.0.0 -1 809
- 200.446386 13 2 SIP 550 ------- 0 2.0.10.0 2.0.0.0 -1 809
r 200.45643 13 2 SIP 550 ------- 0 2.0.10.0 2.0.0.0 -1 809
+ 200.45643 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
- 200.45643 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
r 200.466474 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
+ 200.466474 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
- 200.466474 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
s 200.525088990 _14_ AGT  --- 804 SIP_INVITE 800 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 200.525089 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
- 200.525089 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
r 200.646175 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 806
+ 200.646175 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 806
- 200.646175 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 806
r 200.666694 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
+ 200.666694 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
- 200.666694 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
r 200.725671 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
+ 200.725671 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
- 200.725671 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
r 200.846357 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 806
r 200.846356626 _14_ AGT  --- 806 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 200.867094 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
r 200.867093808 _14_ AGT  --- 811 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 200.867093808 _14_ AGT  --- 812 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 200.872933808 _33_ AGT  --- 812 SIP_183 570 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 200.873200808 _33_ AGT  --- 813 SIP_PRACK 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 200.877460808 _14_ AGT  --- 813 SIP_PRACK 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 200.877460808 _14_ AGT  --- 814 SIP_PRACK 300 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 200.877461 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
- 200.877461 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
r 200.925991 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
+ 200.925991 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
- 200.925991 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
r 200.936055 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 804
+ 200.936055 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
- 200.936055 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
r 200.946099 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
+ 200.946099 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
- 200.946099 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
+ 200.946386 13 2 SIP 550 ------- 0 2.0.10.0 2.0.0.0 -1 809
- 200.946386 13 2 SIP 550 ------- 0 2.0.10.0 2.0.0.0 -1 809
r 200.95643 13 2 SIP 550 ------- 0 2.0.10.0 2.0.0.0 -1 809
+ 200.95643 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 815
- 200.95643 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 815
r 200.966474 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 815
+ 200.966474 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 815
- 200.966474 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 815
r 201.077679 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
+ 201.077679 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
- 201.077679 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
r 201.146319 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
+ 201.146319 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
- 201.146319 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
r 201.166694 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 815
+ 201.166694 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 815
- 201.166694 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 815
r 201.277799 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
+ 201.277799 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
- 201.277799 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
```

```
r 201.287823 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
+ 201.287823 2 13 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 816
- 201.287823 2 13 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 816
r 201.297847 2 13 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 816
+ 201.298114 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 817
- 201.298114 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 817
+ 201.298114 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 818
- 201.298134 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 818
r 201.308134 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 817
+ 201.308134 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
- 201.308134 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
r 201.308154 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 818
+ 201.308154 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 820
- 201.308154 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 820
r 201.318154 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
+ 201.318154 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
- 201.318154 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
r 201.318174 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 820
+ 201.318174 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 820
- 201.318254 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 820
r 201.346719 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 811
r 201.346718808 _14_ AGT  --- 811 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 201.346718808 _14_ AGT  --- 821 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 201.353098808 _33_ AGT  --- 821 SIP_183 570 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
r 201.367094 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 815
r 201.367093808  14  AGT  --- 815 SIP 183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 201.367093808 _14_ AGT  --- 822 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
s 201.373200808 _33_ AGT  --- 813 SIP_PRACK 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 201.373253808 _33_ AGT  --- 822 SIP_183 570 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 201.377460808 _14_ AGT  --- 814 SIP_PRACK 300 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 201.377461 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
- 201.377461 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
r 201.377697808  14  AGT  --- 813 SIP PRACK 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
r 201.518254 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
+ 201.518254 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
- 201.518254 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
r 201.518354 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 820
+ 201.518354 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 820
- 201.518436 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 820
r 201.577679 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
+ 201.577679 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
- 201.577679 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
r 201.718436 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
r 201.718435808 _14_ AGT  --- 819 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 201.718435808 _14_ AGT  --- 824 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 201.718618 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 820
r 201.718617626 _14_ AGT  --- 820 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 201.718617626 _14_ AGT  --- 825 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 201.722175808 _33_ AGT  --- 824 SIP_200 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
r 201.726019808 _33_ AGT  --- 825 SIP_180 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
r 201.777799 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
+ 201.777799 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
- 201.777799 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
r 201.787823 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 814
+ 201.787823 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
- 201.787823 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
r 201.797843 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
+ 201.797843 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
- 201.797843 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
r 201.997943 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
+ 201.997943 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
- 201.997943 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
r 202.198125 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 819
r 202.198124808 _14_ AGT  --- 819 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
v 202.63265999999999 eval {set sim_annotation {alice14@vnet.com starts session to bob7@homenet.com}}
s 202.632660000 _29_ AGT  --- 829 SIP_INVITE 800 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 202.640780000 _14_ AGT  --- 829 SIP_INVITE 820 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 202.640780000 _14_ AGT  --- 830 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
s 202.640780000  14  AGT  --- 831 SIP INVITE 800 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 202.64078 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
- 202.64078 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
r 202.645004000  29  AGT  --- 830 SIP 100 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
r 202.841362 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
+ 202.841362 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
- 202.841362 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
r 203.041682 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
+ 203.041682 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
- 203.041682 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
r 203.051746 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
+ 203.051746 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 832
- 203.051746 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 832
+ 203.051746 2 11 SIP 800 ------- 0 2.0.0.0 2.0.8.0 -1 833
- 203.051746 2 11 SIP 800 ------- 0 2.0.0.0 2.0.8.0 -1 833
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r 203.061766 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 832
+ 203.061766 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 832
- 203.061766 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 832
r 203.06181 2 11 SIP 800 ------- 0 2.0.0.0 2.0.8.0 -1 833
+ 203.062077 11 2 SIP 550 ------- 0 2.0.8.0 2.0.0.0 -1 835
- 203.062077 11 2 SIP 550 ------- 0 2.0.8.0 2.0.0.0 -1 835
r 203.072121 11 2 SIP 550 ------- 0 2.0.8.0 2.0.0.0 -1 835
+ 203.072121 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
- 203.072121 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
r 203.082165 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
+ 203.082165 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
- 203.082165 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
+ 203.130767 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 837
- 203.130767 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 837
s 203.140780000  14  AGT  --- 831 SIP INVITE 800 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 203.14078 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
- 203.14078 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
r 203.140787 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 837
+ 203.140787 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 838
- 203.140787 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 838
r 203.150807 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 838
+ 203.150807 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 838
- 203.150807 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 838
r 203.261866 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 832
+ 203.261866 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 832
- 203.261866 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 832
r 203.282385 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
+ 203.282385 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
- 203.282385 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
r 203.341362 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
+ 203.341362 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
- 203.341362 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
r 203.350907 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 838
+ 203.350907 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 838
- 203.350907 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 838
r 203.462048 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 832
r 203.462047636 _14_ AGT  --- 832 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 203.482785 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
r 203.482784818 _14_ AGT  --- 836 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 203.482784818 _14_ AGT  --- 839 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 203.489024818  29  AGT  --- 839 SIP 183 570 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 203.489291818  29  AGT  --- 840 SIP PRACK 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 203.493491818  14  AGT  --- 840 SIP PRACK 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 203.493491818 _14_ AGT  --- 841 SIP_PRACK 300 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 203.493492 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
- 203.493492 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
r 203.541682 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
+ 203.541682 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
- 203.541682 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
r 203.551088 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 838
r 203.551088451 _14_ AGT  --- 838 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 203.551088451 _14_ AGT  --- 842 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 203.551746 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 831
+ 203.551746 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
- 203.551746 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
r 203.554968451 _33_ AGT  --- 842 SIP_200 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 203.555235451 _33_ AGT  --- 843 SIP_ACK 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 203.559555451 _14_ AGT  --- 843 SIP_ACK 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 203.559555451 _14_ AGT  --- 844 SIP_ACK 300 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 203.559555 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 844
- 203.559555 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 844
r 203.56179 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
+ 203.56179 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
- 203.56179 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
+ 203.562077 11 2 SIP 550 ------- 0 2.0.8.0 2.0.0.0 -1 835
- 203.562077 11 2 SIP 550 ------- 0 2.0.8.0 2.0.0.0 -1 835
r 203.572121 11 2 SIP 550 ------- 0 2.0.8.0 2.0.0.0 -1 835
+ 203.572121 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
- 203.572121 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
r 203.582165 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
+ 203.582165 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
- 203.582165 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
+ 203.630767 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 837
- 203.630767 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 837
r 203.640787 13 2 SIP 250 ------- 0 2.0.10.0 2.0.0.0 -1 837
+ 203.640787 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 846
- 203.640787 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 846
r 203.650807 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 846
+ 203.650807 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 846
- 203.650807 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 846
r 203.69371 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
+ 203.69371 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
- 203.69371 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
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r 203.759774 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 844
+ 203.759774 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 844
- 203.759774 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 844
r 203.76201 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
+ 203.76201 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
- 203.76201 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
r 203.782385 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
+ 203.782385 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
- 203.782385 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
r 203.850907 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 846
+ 203.850907 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 846
- 203.850907 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 846
r 203.89383 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
+ 203.89383 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
- 203.89383 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
r 203.903854 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
+ 203.903854 2 11 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 847
- 203.903854 2 11 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 847
r 203.913878 2 11 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 847
+ 203.914145 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 848
- 203.914145 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 848
+ 203.914145 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 849
- 203.914165 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 849
r 203.924165 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 848
+ 203.924165 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
- 203.924165 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
r 203.924185 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 849
+ 203.924185 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 851
- 203.924185 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 851
r 203.934185 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
+ 203.934185 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
- 203.934185 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
r 203.934205 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 851
+ 203.934205 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 851
- 203.934285 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 851
r 203.959894 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 844
+ 203.959894 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 844
- 203.959894 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 844
r 203.96241 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 836
r 203.962409818 _14_ AGT  --- 836 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 203.962409818  14  AGT  --- 852 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 203.968789818  29  AGT  --- 852 SIP 183 570 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
r 203.969918 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 844
+ 203.969918 2 13 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 853
- 203.969918 2 13 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 853
r 203.979942 2 13 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 853
r 203.982785 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 845
r 203.982784818 _14_ AGT  --- 845 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 203.982784818 _14_ AGT  --- 854 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 203.988944818 _29_ AGT  --- 854 SIP_183 570 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 203.989291818 _29_ AGT  --- 840 SIP_PRACK 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
s 203.993491818 _14_ AGT  --- 841 SIP_PRACK 300 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 203.993492 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
- 203.993492 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
r 203.993571818 _14_ AGT  --- 840 SIP_PRACK 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
r 204.051088 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 846
r 204.051088451 _14_ AGT  --- 846 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 204.051088451 _14_ AGT  --- 855 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 204.054668451 _33_ AGT  --- 855 SIP_200 270 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 204.054935451 _33_ AGT  --- 856 SIP_ACK 300 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 204.059035451  14  AGT  --- 856 SIP ACK 320 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 204.059035451  14  AGT  --- 857 SIP ACK 300 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 204.059035 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 857
- 204.059035 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 857
r 204.134285 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
+ 204.134285 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
- 204.134285 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
r 204.134385 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 851
+ 204.134385 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 851
- 204.134467 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 851
r 204.19371 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
+ 204.19371 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
- 204.19371 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
r 204.259254 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 857
+ 204.259254 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 857
- 204.259254 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 857
r 204.334467 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
r 204.334466818 _14_ AGT  --- 850 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 204.334466818 _14_ AGT  --- 858 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 204.334649 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 851
r 204.334648636  14  AGT  --- 851 SIP 180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 204.334648636  14  AGT  --- 859 SIP 180 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 204.338426818 _29_ AGT  --- 858 SIP_200 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
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r 204.342490818 _29_ AGT  --- 859 SIP_180 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
r 204.39383 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
+ 204.39383 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
- 204.39383 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
r 204.403854 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 841
+ 204.403854 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
- 204.403854 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
r 204.413874 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
+ 204.413874 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
- 204.413874 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
r 204.459374 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 857
+ 204.459374 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 857
- 204.459374 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 857
r 204.469398 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 857
+ 204.469398 2 13 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 861
- 204.469398 2 13 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 861
r 204.479422 2 13 SIP 300 ------- 0 2.0.0.0 2.0.10.0 -1 861
r 204.613974 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
+ 204.613974 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
- 204.613974 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
r 204.814156 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 850
r 204.814155818 _14_ AGT  --- 850 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
+ 206.296735 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 866
- 206.296735 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 866
r 206.306755 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 866
+ 206.306755 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 867
- 206.306755 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 867
r 206.316775 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 867
+ 206.316775 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 867
- 206.316775 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 867
r 206.516875 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 867
+ 206.516875 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 867
- 206.516875 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 867
r 206.717057 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 867
r 206.717056987  14  AGT  --- 867 SIP 200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 206.717056987 _14_ AGT  --- 870 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 206.720896987 _29_ AGT  --- 870 SIP_200 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 206.721163987 _29_ AGT  --- 871 SIP_ACK 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 206.725003987 _14_ AGT  --- 871 SIP_ACK 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 206.725003987 _14_ AGT  --- 872 SIP_ACK 300 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 206.725004 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
- 206.725004 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
+ 206.796735 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 866
- 206.796735 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 866
r 206.806755 11 2 SIP 250 ------- 0 2.0.8.0 2.0.0.0 -1 866
+ 206.806755 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 873
- 206.806755 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 873
r 206.816775 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 873
+ 206.816775 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 873
- 206.816775 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 873
r 206.925222 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
+ 206.925222 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
- 206.925222 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
r 207.016875 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 873
+ 207.016875 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 873
- 207.016875 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 873
r 207.125342 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
+ 207.125342 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
- 207.125342 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
r 207.135366 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 872
+ 207.135366 2 11 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 874
- 207.135366 2 11 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 874
r 207.14539 2 11 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 874
r 207.217057 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 873
r 207.217056987 _14_ AGT  --- 873 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 207.217056987 _14_ AGT  --- 875 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 207.220756987 _29_ AGT  --- 875 SIP_200 270 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 207.221023987 _29_ AGT  --- 876 SIP_ACK 300 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 207.225043987  14  AGT  --- 876 SIP ACK 320 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 207.225043987 _14_ AGT  --- 877 SIP_ACK 300 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 207.225044 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 877
- 207.225044 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 877
r 207.425262 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 877
+ 207.425262 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 877
- 207.425262 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 877
r 207.625382 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 877
+ 207.625382 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 877
- 207.625382 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 877
r 207.635406 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 877
+ 207.635406 2 11 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 879
- 207.635406 2 11 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 879
r 207.64543 2 11 SIP 300 ------- 0 2.0.0.0 2.0.8.0 -1 879
```

```
v 209.40281999999999 eval {set sim_annotation {sipbob(4)@homenet.com say bye to sipalice(8)@vnet.com (any side
may terminate the call)}}
+ 209.40282 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 880
- 209.40282 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 880
r 209.412844 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 880
+ 209.412844 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
- 209.412844 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
r 209.422868 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
+ 209.422868 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
- 209.422868 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
r 209.622988 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
+ 209.622988 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
- 209.622988 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
r 209.823206 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
r 209.823206182  14  AGT  --- 881 SIP BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 209.823206182 _14_ AGT  --- 883 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.9:0 32 0]
r 209.827186182 _23_ AGT  --- 883 SIP_BYE 320 [13a 9 0 800] ------- [1.0.0:0 1.0.9:0 32 1.0.9]
s 209.827453182 _23_ AGT  --- 884 SIP_200 250 [0 0 0 0] ------- [1.0.9:0 1.0.0:0 32 0]
r 209.831113182 _14_ AGT  --- 884 SIP_200 270 [13a 0 9 800] ------- [1.0.9:0 1.0.0:0 32 1.0.0]
s 209.831113182 _14_ AGT  --- 885 SIP_200 250 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 209.831113 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
- 209.831113 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
+ 209.90282 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 880
- 209.90282 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 880
+ 209.912844 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
- 209.912844 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
r 209.912844 8 2 SIP 300 ------- 0 2.0.5.0 2.0.0.0 -1 880
r 209.922868 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
+ 209.922868 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
- 209.922868 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
r 210.031295 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
+ 210.031295 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
- 210.031295 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
r 210.122988 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
+ 210.122988 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
- 210.122988 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
r 210.231395 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
+ 210.231395 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
- 210.231395 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
r 210.241415 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
+ 210.241415 2 8 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 886
- 210.241415 2 8 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 886
r 210.251435 2 8 SIP 250 ------- 0 2.0.0.0 2.0.5.0 -1 886
r 210.323206 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 881
r 210.323206182 _14_ AGT  --- 881 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 210.323206182 _14_ AGT  --- 885 SIP_200 250 [13a 0 9 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 210.323206 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
- 210.323206 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
r 210.523388 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
+ 210.523388 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
- 210.523388 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
r 210.723488 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
+ 210.723488 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
- 210.723488 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
r 210.733508 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 885
v 223.25593000000001 eval {set sim_annotation {alice16@vnet.com starts session to bob8@homenet.com}}
s 223.255930000 _31_ AGT  --- 908 SIP_INVITE 800 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 223.264010000 _14_ AGT  --- 908 SIP_INVITE 820 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 223.264010000 _14_ AGT  --- 909 SIP_100 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
s 223.264010000 _14_ AGT  --- 910 SIP_INVITE 800 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 223.26401 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
- 223.26401 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
r 223.267914000  31  AGT  --- 909 SIP 100 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
r 223.464592 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
+ 223.464592 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
- 223.464592 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
r 223.664912 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
+ 223.664912 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
- 223.664912 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
r 223.674976 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
+ 223.674976 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 912
- 223.674976 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 912
+ 223.674976 2 12 SIP 800 ------- 0 2.0.0.0 2.0.9.0 -1 913
- 223.674976 2 12 SIP 800 ------- 0 2.0.0.0 2.0.9.0 -1 913
r 223.684996 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 912
+ 223.684996 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 912
- 223.684996 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 912
r 223.68504 2 12 SIP 800 ------- 0 2.0.0.0 2.0.9.0 -1 913
+ 223.685307 12 2 SIP 550 ------- 0 2.0.9.0 2.0.0.0 -1 915
- 223.685307 12 2 SIP 550 ------- 0 2.0.9.0 2.0.0.0 -1 915
r 223.695351 12 2 SIP 550 ------- 0 2.0.9.0 2.0.0.0 -1 915
+ 223.695351 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
- 223.695351 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
```

```
r 223.705395 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
+ 223.705395 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
- 223.705395 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
s 223.764010000 _14_ AGT  --- 910 SIP_INVITE 800 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 223.76401 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
- 223.76401 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
r 223.885096 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 912
+ 223.885096 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 912
- 223.885096 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 912
r 223.905615 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
+ 223.905615 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
- 223.905615 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
r 223.964592 14 3 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
+ 223.964592 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
- 223.964592 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
v 224.02224999999999 eval {set sim_annotation {sipbob(5)@homenet.com say bye to sipalice(10)@vnet.com (any side
may terminate the call)}}
+ 224.02225 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 918
- 224.02225 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 918
r 224.032274 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 918
+ 224.032274 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
- 224.032274 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
r 224.042298 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
+ 224.042298 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
- 224.042298 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
r 224.085278 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 912
r 224.085277636 _14_ AGT  --- 912 SIP_100 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
r 224.106015 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
r 224.106014818 _14_ AGT  --- 916 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 224.106014818 _14_ AGT  --- 920 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 224.112094818 _31_ AGT  --- 920 SIP_183 570 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 224.112361818 _31_ AGT  --- 921 SIP_PRACK 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 224.116241818  14  AGT  --- 921 SIP PRACK 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 224.116241818  14  AGT  --- 922 SIP PRACK 300 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 224.116242 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
- 224.116242 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
r 224.164912 3 0 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
+ 224.164912 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
- 224.164912 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
r 224.174976 0 2 SIP 800 ------- 0 1.0.0.0 2.0.0.0 -1 910
+ 224.174976 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
- 224.174976 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
r 224.18502 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
+ 224.18502 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
- 224.18502 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
+ 224.185307 12 2 SIP 550 ------- 0 2.0.9.0 2.0.0.0 -1 915
- 224.185307 12 2 SIP 550 ------- 0 2.0.9.0 2.0.0.0 -1 915
r 224.195351 12 2 SIP 550 ------- 0 2.0.9.0 2.0.0.0 -1 915
+ 224.195351 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 923
- 224.195351 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 923
r 224.205395 2 0 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 923
+ 224.205395 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 923
- 224.205395 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 923
r 224.242418 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
+ 224.242418 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
- 224.242418 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
r 224.31646 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
+ 224.31646 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
- 224.31646 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
r 224.38524 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
+ 224.38524 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
- 224.38524 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
r 224.405615 0 3 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 923
+ 224.405615 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 923
- 224.405615 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 923
r 224.442636 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
r 224.442636182 _14_ AGT  --- 919 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 224.442636182 _14_ AGT  --- 924 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.11:0 32 0]
r 224.446636182  25  AGT  --- 924 SIP BYE 320 [13a b 0 800] ------- [1.0.0:0 1.0.11:0 32 1.0.11]
s 224.446903182 _25_ AGT  --- 925 SIP_200 250 [0 0 0 0] ------- [1.0.11:0 1.0.0:0 32 0]
r 224.450543182 _14_ AGT  --- 925 SIP_200 270 [13a 0 b 800] ------- [1.0.11:0 1.0.0:0 32 1.0.0]
s 224.450543182  14  AGT  --- 926 SIP 200 250 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 224.450543 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
- 224.450543 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
r 224.51658 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
+ 224.51658 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
- 224.51658 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
+ 224.52225 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 918
- 224.52225 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 918
r 224.526604 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
+ 224.526604 2 12 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 927
- 224.526604 2 12 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 927
+ 224.532274 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
```

```
- 224.532274 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
r 224.532274 9 2 SIP 300 ------- 0 2.0.6.0 2.0.0.0 -1 918
r 224.536628 2 12 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 927
+ 224.536895 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 928
- 224.536895 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 928
+ 224.536895 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 929
- 224.536915 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 929
r 224.542298 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
+ 224.542298 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
- 224.542298 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
r 224.546915 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 928
+ 224.546915 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
- 224.546915 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
r 224.546935 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 929
+ 224.546935 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 931
- 224.546935 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 931
r 224.556935 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
+ 224.556935 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
- 224.556935 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
r 224.556955 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 931
+ 224.556955 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 931
- 224.557035 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 931
r 224.58564 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 916
r 224.585639818 _14_ AGT  --- 916 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 224.585639818  14  AGT  --- 932 SIP 183 550 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 224.591999818  31  AGT  --- 932 SIP 183 570 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
r 224.606015 3 14 SIP 550 ------- 0 2.0.0.0 1.0.0.0 -1 923
r 224.606014818 _14_ AGT  --- 923 SIP_183 550 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 224.606014818 _14_ AGT  --- 933 SIP_183 550 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 224.612274818 _31_ AGT  --- 933 SIP_183 570 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 224.612361818 _31_ AGT  --- 921 SIP_PRACK 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
s 224.616241818 _14_ AGT  --- 922 SIP_PRACK 300 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 224.616242 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
- 224.616242 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
r 224.616778818  14  AGT  --- 921 SIP PRACK 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
r 224.650725 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
+ 224.650725 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
- 224.650725 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
r 224.742418 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
+ 224.742418 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
- 224.742418 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
r 224.757035 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
+ 224.757035 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
- 224.757035 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
r 224.757135 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 931
+ 224.757135 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 931
- 224.757217 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 931
r 224.81646 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
+ 224.81646 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
- 224.81646 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
r 224.850825 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
+ 224.850825 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
- 224.850825 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
r 224.860845 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
+ 224.860845 2 9 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 934
- 224.860845 2 9 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 934
r 224.870865 2 9 SIP 250 ------- 0 2.0.0.0 2.0.6.0 -1 934
r 224.942636 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 919
r 224.942636182 _14_ AGT  --- 919 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 224.942636182 _14_ AGT  --- 926 SIP_200 250 [13a 0 b 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 224.942636 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
- 224.942636 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
r 224.957217 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
r 224.957216818 _14_ AGT  --- 930 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 224.957216818 _14_ AGT  --- 935 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 224.957399 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 931
r 224.957398636 _14_ AGT  --- 931 SIP_180 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 224.957398636 _14_ AGT  --- 936 SIP_180 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 224.960696818  31  AGT  --- 935 SIP 200 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
r 224.964420818 _31_ AGT  --- 936 SIP_180 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
r 225.01658 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
+ 225.01658 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
- 225.01658 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
r 225.026604 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 922
+ 225.026604 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
- 225.026604 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
r 225.036624 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
+ 225.036624 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
- 225.036624 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
r 225.142818 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
+ 225.142818 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
- 225.142818 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
r 225.236724 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
```

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+ 225.236724 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
- 225.236724 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
r 225.342918 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
+ 225.342918 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
- 225.342918 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
r 225.352938 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 926
r 225.436906 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 930
r 225.436905818 _14_ AGT  --- 930 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
+ 227.491558 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 944
- 227.491558 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 944
r 227.501578 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 944
+ 227.501578 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 945
- 227.501578 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 945
r 227.511598 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 945
+ 227.511598 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 945
- 227.511598 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 945
r 227.711698 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 945
+ 227.711698 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 945
- 227.711698 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 945
r 227.91188 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 945
r 227.911879586 _14_ AGT  --- 945 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 227.911879586 _14_ AGT  --- 946 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 227.915839586 _31_ AGT  --- 946 SIP_200 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 227.916106586 _31_ AGT  --- 947 SIP_ACK 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 227.919986586  14  AGT  --- 947 SIP ACK 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 227.919986586  14  AGT  --- 948 SIP ACK 300 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 227.919987 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 948
- 227.919987 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 948
+ 227.991558 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 944
- 227.991558 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 944
r 228.001578 12 2 SIP 250 ------- 0 2.0.9.0 2.0.0.0 -1 944
+ 228.001578 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 949
- 228.001578 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 949
r 228.011598 2 0 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 949
+ 228.011598 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 949
- 228.011598 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 949
r 228.120205 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 948
+ 228.120205 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 948
- 228.120205 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 948
r 228.211698 0 3 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 949
+ 228.211698 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 949
- 228.211698 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 949
r 228.320325 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 948
+ 228.320325 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 948
- 228.320325 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 948
r 228.330349 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 948
+ 228.330349 2 12 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 950
- 228.330349 2 12 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 950
r 228.340373 2 12 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 950
r 228.41188 3 14 SIP 250 ------- 0 2.0.0.0 1.0.0.0 -1 949
r 228.411879586 _14_ AGT  --- 949 SIP_200 250 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 228.411879586 _14_ AGT  --- 953 SIP_200 250 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
r 228.415459586  31  AGT  --- 953 SIP 200 270 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 228.415726586  31  AGT  --- 954 SIP ACK 300 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 228.419566586 _14_ AGT  --- 954 SIP_ACK 320 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 228.419566586 _14_ AGT  --- 955 SIP_ACK 300 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 228.419567 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 955
- 228.419567 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 955
r 228.619785 14 3 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 955
+ 228.619785 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 955
- 228.619785 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 955
r 228.819905 3 0 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 955
+ 228.819905 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 955
- 228.819905 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 955
r 228.829929 0 2 SIP 300 ------- 0 1.0.0.0 2.0.0.0 -1 955
+ 228.829929 2 12 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 956
- 228.829929 2 12 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 956
r 228.839953 2 12 SIP 300 ------- 0 2.0.0.0 2.0.9.0 -1 956
v 233.56644 eval {set sim annotation {sipbob(6)@homenet.com say bye to sipalice(12)@vnet.com (any side may
terminate the call)}}
+ 233.56644 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 965
- 233.56644 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 965
r 233.576464 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 965
+ 233.576464 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
- 233.576464 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
r 233.586488 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
+ 233.586488 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
- 233.586488 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
r 233.786608 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
+ 233.786608 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
- 233.786608 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
r 233.986826 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
r 233.986826182 _14_ AGT  --- 966 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
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s 233.986826182 _14_ AGT  --- 967 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.13:0 32 0]
r 233.990966182 _27_ AGT  --- 967 SIP_BYE 320 [13a d 0 800] ------- [1.0.0:0 1.0.13:0 32 1.0.13]
s 233.991233182 _27_ AGT  --- 968 SIP_200 250 [0 0 0 0] ------- [1.0.13:0 1.0.0:0 32 0]
r 233.995213182 _14_ AGT  --- 968 SIP_200 270 [13a 0 d 800] ------- [1.0.13:0 1.0.0:0 32 1.0.0]
s 233.995213182  14  AGT  --- 969 SIP 200 250 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 233.995213 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
- 233.995213 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
+ 234.06644 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 965
- 234.06644 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 965
+ 234.076464 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
- 234.076464 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
r 234.076464 10 2 SIP 300 ------- 0 2.0.7.0 2.0.0.0 -1 965
r 234.086488 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
+ 234.086488 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
- 234.086488 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
r 234.195395 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
+ 234.195395 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
- 234.195395 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
r 234.286608 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
+ 234.286608 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
- 234.286608 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
r 234.395495 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
+ 234.395495 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
- 234.395495 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
r 234.405515 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
+ 234.405515 2 10 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 970
- 234.405515 2 10 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 970
r 234.415535 2 10 SIP 250 ------- 0 2.0.0.0 2.0.7.0 -1 970
r 234.486826 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 966
r 234.486826182 _14_ AGT  --- 966 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 234.486826182 _14_ AGT  --- 969 SIP_200 250 [13a 0 d 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 234.486826 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
- 234.486826 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
r 234.687008 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
+ 234.687008 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
- 234.687008 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
r 234.887108 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
+ 234.887108 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
- 234.887108 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
r 234.897128 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 969
v 245.01676899 eval {set sim annotation {sipbob(9)@homenet.com say bye to sipalice(18)@vnet.com (any side may
terminate the call)}}
+ 245.016769 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 992
- 245.016769 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 992
r 245.026793 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 992
+ 245.026793 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
- 245.026793 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
r 245.036817 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
+ 245.036817 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
- 245.036817 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
r 245.236937 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
+ 245.236937 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
- 245.236937 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
r 245.437155 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
r 245.437155172 _14_ AGT  --- 993 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 245.437155172 _14_ AGT  --- 994 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.19:0 32 0]
r 245.440975172 _33_ AGT  --- 994 SIP_BYE 320 [13a 13 0 800] ------- [1.0.0:0 1.0.19:0 32 1.0.19]
s 245.441242172 _33_ AGT  --- 995 SIP_200 250 [0 0 0 0] ------- [1.0.19:0 1.0.0:0 32 0]
r 245.445222172 _14_ AGT  --- 995 SIP_200 270 [13a 0 13 800] ------- [1.0.19:0 1.0.0:0 32 1.0.0]
s 245.445222172 _14_ AGT  --- 996 SIP_200 250 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 245.445222 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
- 245.445222 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
+ 245.516769 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 992
- 245.516769 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 992
+ 245.526793 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
- 245.526793 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
r 245.526793 13 2 SIP 300 ------- 0 2.0.10.0 2.0.0.0 -1 992
r 245.536817 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
+ 245.536817 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
- 245.536817 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
r 245.645404 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
+ 245.645404 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
- 245.645404 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
r 245.736937 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
+ 245.736937 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
- 245.736937 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
r 245.845504 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
+ 245.845504 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
- 245.845504 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
r 245.855524 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
+ 245.855524 2 13 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 997
- 245.855524 2 13 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 997
r 245.865544 2 13 SIP 250 ------- 0 2.0.0.0 2.0.10.0 -1 997
```

```
r 245.937155 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 993
r 245.937155172 _14_ AGT  --- 993 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 245.937155172 _14_ AGT  --- 996 SIP_200 250 [13a 0 13 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 245.937155 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
- 245.937155 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
r 246.137337 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
+ 246.137337 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
- 246.137337 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
r 246.337437 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
+ 246.337437 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
- 246.337437 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
r 246.347457 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 996
v 247.63265999999999 eval {set sim annotation {sipbob(7)@homenet.com say bye to sipalice(14)@vnet.com (any side
may terminate the call)}}
+ 247.63266 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 999
- 247.63266 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 999
r 247.642684 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 999
+ 247.642684 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
- 247.642684 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
r 247.652708 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
+ 247.652708 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
- 247.652708 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
r 247.852828 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
+ 247.852828 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
- 247.852828 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
r 248.053046 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
r 248.053046182 _14_ AGT  --- 1000 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 248.053046182 _14_ AGT  --- 1002 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.15:0 32 0]
r 248.057286182 _29_ AGT  --- 1002 SIP_BYE 320 [13a f 0 800] ------- [1.0.0:0 1.0.15:0 32 1.0.15]
s 248.057553182 _29_ AGT  --- 1003 SIP_200 250 [0 0 0 0] ------- [1.0.15:0 1.0.0:0 32 0]
r 248.061413182 _14_ AGT  --- 1003 SIP_200 270 [13a 0 f 800] ------- [1.0.15:0 1.0.0:0 32 1.0.0]
s 248.061413182 _14_ AGT  --- 1004 SIP_200 250 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 248.061413 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
- 248.061413 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
+ 248.13266 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 999
- 248.13266 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 999
+ 248.142684 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
- 248.142684 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
r 248.142684 11 2 SIP 300 ------- 0 2.0.8.0 2.0.0.0 -1 999
r 248.152708 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
+ 248.152708 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
- 248.152708 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
r 248.261595 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
+ 248.261595 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
- 248.261595 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
r 248.352828 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
+ 248.352828 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
- 248.352828 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
r 248.461695 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
+ 248.461695 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
- 248.461695 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
r 248.471715 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
+ 248.471715 2 11 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 1005
- 248.471715 2 11 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 1005
r 248.481735 2 11 SIP 250 ------- 0 2.0.0.0 2.0.8.0 -1 1005
r 248.553046 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1000
r 248.553046182 _14_ AGT  --- 1000 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 248.553046182 _14_ AGT  --- 1004 SIP_200 250 [13a 0 f 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 248.553046 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
- 248.553046 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
r 248.753228 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
+ 248.753228 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
- 248.753228 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
r 248.953328 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
+ 248.953328 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
- 248.953328 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
r 248.963348 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1004
v 268.25593000000003 eval {set sim_annotation {sipbob(8)@homenet.com say bye to sipalice(16)@vnet.com (any side
may terminate the call)}}
+ 268.25593 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 1038
- 268.25593 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 1038
r 268.265954 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 1038
+ 268.265954 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
- 268.265954 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
r 268.275978 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
+ 268.275978 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
- 268.275978 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
r 268.476098 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
+ 268.476098 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
- 268.476098 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
r 268.676316 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
r 268.676316182  14  AGT  --- 1039 SIP BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 268.676316182 _14_ AGT  --- 1042 SIP_BYE 300 [0 0 0 0] ------- [1.0.0:0 1.0.17:0 32 0]
```

```
r 268.680236182 _31_ AGT  --- 1042 SIP_BYE 320 [13a 11 0 800] ------- [1.0.0:0 1.0.17:0 32 1.0.17]
s 268.680503182 _31_ AGT  --- 1043 SIP_200 250 [0 0 0 0] ------- [1.0.17:0 1.0.0:0 32 0]
r 268.684123182 _14_ AGT  --- 1043 SIP_200 270 [13a 0 11 800] ------- [1.0.17:0 1.0.0:0 32 1.0.0]
s 268.684123182 _14_ AGT  --- 1044 SIP_200 250 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 268.684123 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
- 268.684123 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
+ 268.75593 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 1038
- 268.75593 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 1038
+ 268.765954 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
- 268.765954 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
r 268.765954 12 2 SIP 300 ------- 0 2.0.9.0 2.0.0.0 -1 1038
r 268.775978 2 0 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
+ 268.775978 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
- 268.775978 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
r 268.884305 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
+ 268.884305 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
- 268.884305 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
r 268.976098 0 3 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
+ 268.976098 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
- 268.976098 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
r 269.084405 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
+ 269.084405 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
- 269.084405 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
r 269.094425 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
+ 269.094425 2 12 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 1046
- 269.094425 2 12 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 1046
r 269.104445 2 12 SIP 250 ------- 0 2.0.0.0 2.0.9.0 -1 1046
r 269.176316 3 14 SIP 300 ------- 0 2.0.0.0 1.0.0.0 -1 1039
r 269.176316182 _14_ AGT  --- 1039 SIP_BYE 300 [0 0 0 0] ------- [2.0.0:0 1.0.0:0 29 0]
s 269.176316182 _14_ AGT  --- 1044 SIP_200 250 [13a 0 11 800] ------- [1.0.0:0 2.0.0:0 32 1.0.0]
+ 269.176316 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
- 269.176316 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
r 269.376498 14 3 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
+ 269.376498 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
- 269.376498 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
r 269.576598 3 0 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
+ 269.576598 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
- 269.576598 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
r 269.586618 0 2 SIP 250 ------- 0 1.0.0.0 2.0.0.0 -1 1044
```

Figure C.5 File trace of scenario 8 and seed position of 110 for Brokered Model

C.3 Awk programing

"AWK is a language for processing files of text. A file is treated as a sequence of records, and by default each line is a record. Each line is broken up into a sequence of fields, so we can think of the first word in a line as the first field, the second word as the second field, and so on. An AWK program is of a sequence of pattern-action statements. AWK reads the input a line at a time. A line is scanned for each pattern in the program, and for each pattern that matches, the associated action is executed." - Alfred V. Aho

When we get the twenty simulation traces files for scenario in each one model (similar files to show in Figure C.3), so that, we needed use awk programming like tool to obtain the delays in the SIP_REGISTER and SIP_INVITE messages, therefore for each kind of message we design one awk file. The *fREG-allD**.awk*** file derive in the obtention of two .dul files; one is the result of found the network registration averages delays in each one scenario (*REG-allD**.dul***); the other file *thREG-allD**.dul*** write only the averages network registration delays for the twelve sceneries of the model. In the same manner the *fINV-allD**.awk*** file get two .dul files, but now found the

averages delays for session initiation in each one scenario (*INV-allD**.dul***); the other file *thINV-allD**.dul*** write only the averages network registration delays for the twelve sceneries of the model. Each time that we execute the *fREG-allD**.awk*** file or the *fINV-allD**.awk,*** the *thREG-allD**.dul*** or *thINV-allD**.dul*** added at the end of file the last average delay founded in the scenario correspondent.

For clarify the form in that work our ***.awk*** files, above is detailed the code in awk programming used for our analysis. We decided to show only one ***.awk*** file for SIP_REGISTER delay and one ***awk*** file for SIP_INVITE, due that practicaly only for lines code in the last function changes. We only need commented or descomented according with the model analyzed.

C.3.1 Awk for network registration

Like was mentioned in the chapter five, the procedure for SIP_REGISTER message is the same in both models (see Figure 5.3).

```
# ====================================================================
#awk FILE FOR FOUND THE AVERAGE DELAYS IN THE NETWORK REGISTRATION PROCEDURE
 #Author: Dulce Selene Rosas Mendieta
# Date : 09/agosto/2009
#File name: fREG-allD.awk
#Note: Depending of the model analyzed is necessary enable or disable the code in the last function.
# ====================================================================
BEGIN{ printf "\n\n\t Tablas de WIRELESS DELAY & OVERALL for processing REGISTER\n\n"

band=0
inv=0
cont=0
d=0
UID=0
}
{
   #inicia programa
    if ("numMsnodes" == $3){
         VNBS=snumMN($4)
         nMN=$4
    }
    if (FNR==2){
                  seed=$4
    }
    if ($1=="D" && $4=="IFQ" && $5=="END" ){
          d++
    }

    if( $1=="s" && $4=="AGT" && $7=="SIP_REGISTER" && $8==300 && VNBS!=$3) {
          ban++
         if (ban%2 ==1 && UID!=$6) {
                  f=0
                  for (i=0; i<cont; i++){
                    if(tir[i]==1){
                           f=2
                           tIniReg[cont]=tIniReg[i]
                           tir[cont]=1
                           next
                           break
                    }
                  }
                  if(f!=2 && aMH[i]!=$3) {
                     aMH[cont]= $3
                     UID=$6
                     tIniReg[cont] = $2
                     tir[cont]=1
```

```
                    fnr=FNR+1
                }
        }
    }

    if( $1=="r" && $4=="AGT" && $7=="SIP_REGISTER" && $8==320 && VNBS==$3 && fnr==FNR) {
        #wireless register D de la VN =)
        tFrw[cont] = $2
        tDrw[cont]=tFrw[cont]-tIniReg[cont]
        tAcumrw=tDrw[cont] + tAcumrw
        x=0
        FNR=FNR + 2
        }
    if(x==0 && $7=="SIP_407" && $1=="s" && VNBS==$3) {
        tIprw[cont]= $2
        #FNR++
        x=1
    }
    if($7=="SIP_REGISTER" && x==1 && $1=="r" && VNBS==$3) {
        tFprw[cont]=$2
        tDprw[cont]=$2-tIprw[cont]
        tAcumprw=tDprw[cont]+ tAcumprw
        x =10
    }

    if( $1=="r" && $4=="AGT" && $7=="SIP_200" && $8==270 && aMH[cont]==$3 && VNBS!=$3) {
        tFinReg[cont] = $2
        tRegMH[cont]=tFinReg[cont]-tIniReg[cont]
        tSumRegMH=tRegMH[cont] + tSumRegMH
        tir[i] =5;
        cont++
     }
   if($1=="D" && $4=="IFQ" && $5=="END"){ d++}
}
END {   tSumRegMH=0
        tAcumrw=0
        tAcumprw=0

        printf "\n\nOVERALL TIME REGISTER"
        printf "\n T  MH\tAlice\tAcumulado\tDelayProc\tTFinal\tTInicial"
        print "\nOVERALL TIME REGISTER" >> "tfREGallD.dul"
        print "MH Alice Acumulado Delay  TFinal  TInicial" >> "tfREGallD.dul"
        for (i=0;i<cont;i++)
        {
                tSumRegMH+=tRegMH[i]
                printf("\nOV %i \t%s \t%f \t%f=\t%f-\t%f", i,aMH[i],tSumRegMH,tRegMH[i],tFinReg[i],tIniReg[i])
                print i,aMH[i],tSumRegMH,tRegMH[i],tFinReg[i],tIniReg[i] >> "tfREGallD.dul"
        }
        printf "\n\n WIRELESS DELAY REGISTER"
        printf "\n T  MH\tAlice\tAcumulado\tDelayProc\tTFinal\tTInicial"
        print "\n WIRELESS DELAY REGISTER" >> "tfREGallD.dul"
        print "MH Alice Acumulado Delay  TFinal  TInicial" >> "tfREGallD.dul"
        for (i=0;i<cont;i++)
        {
                tAcumrw+=tDrw[i]
                printf("\nWR %i \t%s \t%f \t%f= \t%f - \t%f", i,aMH[i],tAcumrw,tDrw[i],tFrw[i],tIniReg[i])
                print  i,aMH[i],tAcumrw,tDrw[i],tFrw[i],tIniReg[i] >> "tfREGallD.dul"
        }
        printf "\n\n AVERAGE PROCESSING WWIRELESS DELAY REGISTER"
        printf "\n T  MH\tAlice\tAcumulado\tDelayProc\tTFinal\tTInicial"
        print "\n AVERAGE PROCESSING DELAY REGISTER" >> "tfREGallD.dul"
        print "MH Alice Acumulado Delay  TFinal  TInicial" >> "tfREGallD.dul"
        for (i=0;i<cont;i++)
        {
                tAcumprw+=tDprw[i]
                printf("\nPR %i \t%s \t%f \t%f= \t%f - \t%f", i,aMH[i],tAcumprw,tDprw[i],tFprw[i],tIprw[i])
                print i,aMH[i],tAcumprw,tDprw[i],tFprw[i],tIprw[i] >> "tfREGallD.dul"
        }

        tAvg_RegMH_D= tSumRegMH/cont
        tAvg_Wreg_D= tAcumrw/cont
        tAvg Wpreg D= tAcumprw/cont
        tAvg Drop= (1-(nMN-d)/nMN)

       print("\n Number of MN ",nMN,seed) >> "tfREGallD.dul"
        print("OVERALL REGISTER Processing Delay ",tAvg_RegMH_D) >> "tfREGallD.dul"
        print("DROP packets in IFQ-END ", d) >> "tfREGallD.dul"
        print("Average of drop packets ", tAvg_Drop) >> "tfREGallD.dul"
        print("WIRELESS REGISTER Processing Delay ",tAvg_Wreg_D) >>  "tfREGallD.dul"
        print("WIRELESS PROCESSING REGISTER Delay ",tAvg_Wpreg_D)>> "tfREGallD.dul"

        print seed,tAvg_RegMH_D,tAvg_Drop, tAvg_Wreg_D, tAvg_Wpreg_D >> "../thREGallD.dul"
        printf("\n\n\t*OVERALL Average REGISTER Delay of %i MH(alice)s is %f with %s",cont,tAvg_RegMH_D,seed)
```

```
        printf("\n\t-Average WIRELESS_REG D is %f",tAvg_Wreg_D)
        printf("\n\t-Average PROCESING WIRELESS _D is %f",tAvg_Wpreg_D)
        printf("\n\t-Number of Packet lost %i ", d)
        printf("\n\t-Average of Packet lost for this scenerie %f \n\n", tAvg_Drop)
}


#Comment or descommet the next function according with the case.
#In this example we supposed that he file to analyzed correspond to Cooperative Model.

#Case 1: In Cooperative Model the next function ougth to be enabled and the case 2 disabled.
function snumMN (numMN)
  {
      if(numMN==1)
         {  MN= "_4_" }
      if(numMN==5)
           {MN= "_8_" }
      if(numMN==10)
           {MN= "_13_" }
      if(numMN==15)
           {MN= "_18_" }
      return MN
  }

#Case 2: In Brokered Model the next code for function snumMN ought to be enabled
#function snumMN (numMN)
#  {
#      if(numMN==1)
#        {  MN="_5_"}
#      if(numMN==5)
#          {MN="_9_"}
#      if(numMN==10)
#          {MN="_14_"}
#      if(numMN==15)
#          {MN="_19_"}
#      return MN
#  }
```

Figure C.6 Awk for REGISTER averages delay in Cooperative Model.

.dul file generated

The file *thREG-allD.dul* (see Figure C.6) generated contains a table with the summary of the averages values for each scenario, after run the awk for network registration file twenty times with differents seed values for random position. The values showed are the following, first value represens the seed for random value in the initial position for the MN; second value corresponds to the overall average register delay; the third value is the cantity of drop packets in this procedure; the fourth column is the average of register wireless delay and; the column final corresponds to the average for wireless network registration procedure delay.

```
seedPos:22 0.0192562 0 0.007077 0.004219
seedPos:33 0.0194388 0 0.0071856 0.004197
seedPos:44 0.0193171 0 0.007079 0.004215
seedPos:55 0.0192268 0 0.007101 0.004127
seedPos:66 0.0191882 0 0.007103 0.004093
seedPos:77 0.0193782 0 0.007141 0.004257
seedPos:88 0.0193625 0 0.007171 0.004165
seedPos:99 0.0194985 0 0.007267 0.004309
seedPos:110 0.0194825 0 0.007177 0.004223
seedPos:121 0.0191202 0 0.006999 0.004161
seedPos:132 0.0190796 0 0.007001 0.004157
seedPos:143 0.0192996 0 0.007139 0.004213
seedPos:154 0.0195953 0 0.00734947 0.004219
seedPos:165 0.0195625 0 0.007159 0.004145
seedPos:176 0.0191785 0 0.007055 0.004159
seedPos:187 0.0190436 0 0.006903 0.004185
seedPos:198 0.0190242 0 0.006929 0.004189
seedPos:209 0.0191139 0 0.006961 0.004201
```

```
seedPos:220 0.0195785 0 0.007181 0.004257
seedPos:231 0.0190782 0 0.007003 0.004125
```

Figure C.7 File thREG-allD.dul for scenario 8 in Cooperative Model..

C.3.2 Awk for session initiation

The Figure C.7 shows the code details in ***awk*** programming to get the average delay values for session initiation in each one scenario.

```
# ======================================================================
# awk FILE FOR FOUND THE AVERAGE DELAYS IN THE SESSION INITIATION PROCEDURE
 #Author: Dulce Selene Rosas Mendieta
# Date : 09/agosto/2009
#File name: fINV-allD.awk
#Note: Depending of the model analyzed is necessary enable or disable the code in the last function.
# ======================================================================

BEGIN{
printf "\n\n\t Tablas para OVERALL & WIRELESS DELAY of INVITE \n\n"
printf "\n\nT Alice\t MH\ttAcumulado\tDelayProc\tTFinal\t\tTInicial\n"
bnf=0
nf=0
ti=0
tf=0
tAcumD=0
existe=0
d=0
b=0
iw=0
piw=0

}
{   nf++
    #inicia programa
        if ("numMsnodes" == $3){
                VNBS=snumMN($4)
                nMN=$4
        }
        if (FNR==2){
                seed=$4
        }
        if ($1=="D" && $4=="IFQ" && $5=="END" ){
         d++
        }
        if($7=="SIP_INVITE" && $1=="s" && $3!=VNBS) {
                for(i=0;i<(nMN);i++){
                        if (tres[i]==$3 )
                        {
                                existe=1
                                next
                        }else {
                                existe=0}
                 }
                if (existe==0) {
                        #printf("\nNo existe inicio para %s\n ",$3)
                        auxi3[cont]=$3
                        tres[nm/2]=$3
                        auxi2=$2
                        bf[nm/2]=0
                        nm++
                        nf++
                        fnr=FNR+1
                        next
                }
         }

        if($1=="r" && $3==VNBS && $7=="SIP_INVITE" && $8=="820" && fnr==FNR){
                #wireless invite D de la VN
                tFiw[cont] = $2
                tIiw[cont] = auxi2
                tDiw[cont]=tFiw[cont]-tIiw[cont]
                tAcumiw=tDiw[cont] + tAcumrw
```

```
                iw++
                printf("\nWI M%i \t%s \t%f \t%f= \t%f - \t%f", iw,$3,tAcumiw,tDiw[cont],tFiw[cont],tIiw[cont])
                print("WI",iw,$3,tAcumiw,tDiw[cont],tFiw[cont],tIiw[cont]) >> "tfINVallD.dul"
        }


        if($1=="r" && $3==VNBS && $7=="SIP_183" && $8=="550"){
                #Processing Invite Wireless D de la VN initial
                uid=$6
                tIpiw= $2
                x=1
        }

        if(x==1 && $1=="s" && $3==VNBS &&  $6>uid && $7=="SIP_PRACK" && $8="300"){
                #wireless invite D de la VN
                x=0
                tFpiw[cont] = $2
                tDpiw[cont]=tFpiw[cont]-tIpiw
                tAcumpiw=tDpiw[cont] + tAcumpiw
                piw++
                printf("\n PI M%i \t%s \t%f \t%f= \t%f - \t%f",piw,$3,tAcumpiw,tDpiw[cont],tFpiw[cont],tIpiw)
        print("PI",piw,$3,tAcumpiw,tDpiw[cont],tFpiw[cont],tIpiw) >> "tfINVallD.dul"
        }


        if($1=="r"  && $7=="SIP_200"){
                #printf("entre if es un sip200...que sea fin del nodo del tres\n ")
                for (i=0;i<nMN;i++){
                      # printf("busco el nodo para ponerle fin entre for \n")
                        if(tres[i] ==$3 && bf[i]==0)
                        {#busca un fin para $3 se supone que solo entra cuando no se le ha asignado un fin
                          auxf2[cont]=$2
                          tDelay[cont]=auxf2[cont]-auxi2
                          tAcumD=tAcumD+tDelay[cont]
                          printf("\nOV M%i
\t%s\t%f\t%f\t%f\t%f\n",cont,$3,tAcumD,tDelay[cont],auxf2[cont],auxi2)
                          print ("OV",cont,$3,tAcumD,tDelay[cont],auxf2[cont],tIiw[cont]) >> "tfINVallD.dul"
                          bf[i]=1
                          nm++
                          i=nMN+1
                          cont++
                        }
                }
        }

}

END {
          tAvgd_INV= (tAcumD / cont)
          tAvg_Winv_D= tAcumiw/iw
          tAvg_Wpinv_D= tAcumpiw/piw
          tAvg_Drop=(1-(nMN-d)/nMN)
          printf("\n\n\t*OVERALL Avg INVITE Delay of %i MH(alice)s is %f with %s",cont,tAvgd_INV,seed)
          printf("\n\n\t-OVERALL Avg INVITE with lost pack %i MH(alice)s is %f",cont+d,tAcumD/(nMN))
          printf("\n\t-Average WIRELESS_INV D is %f",tAvg_Winv_D)
          printf("\n\t-Average PROCESING WIRELESS INVITE _D is %f",tAvg_Wpinv_D)
          printf("\n\t-Number of Packet lost %i ", d)
          printf("\n\t-Average of Packet lost for this escenario %f \n\n",tAvg_Drop )

          print("Number of MN ",nMN, seed) >> "tfINVallD.dul"
          print("OVERALL INVITE Processing Delay ",tAvgd_INV) >> "tfINVallD.dul"
          print("DROP packets in IFQ-END ", d) >> "tfINVallD.dul"
          print("WIRELESS INVITE Processing Delay ",tAvg_Winv_D) >> "tfINVallD.dul"
          print("WIRELESS PROCESSING INVITE Delay ",tAvg_Wpinv_D) >> "tfINVallD.dul"
          print("Average of drop packets ",tAvg_Drop  ) >> "tfINVallD.dul"

          print seed,tAvgd_INV, tAvg_Drop,tAvg_Winv_D, tAvg_Wpinv_D >> "../thINVallD.dul"

#Comment or descommet the next function according with the case.
#In this example we supposed that he file to analyzed correspond to Cooperative Model.

#Case 1: In Cooperative Model the next function ougth to be enabled and the case 2 disabled.
function snumMN (numMN)
  {
      if(numMN==1)
         {  MN= "_4_" }
      if(numMN==5)
           {MN= "_8_" }
      if(numMN==10)
           {MN= "_13_" }
      if(numMN==15)
           {MN= "_18_" }
      return MN
```

```
  }

#Case 2: In Brokered Model the next code for function snumMN ought to be enabled
#function snumMN (numMN)
#  {
#      if(numMN==1)
#        {  MN="_5_"}
#      if(numMN==5)
#          {MN="_9_"}
#      if(numMN==10)
#          {MN="_14_"}
#      if(numMN==15)
#          {MN="_19_"}
#      return MN
#  }
```

Figure C.8. Awk for INVITE averages delay in Cooperative Model

.dul file generated

The file *thINV-allD.dul* generated contains a table with the averages values for each scenario after run the awk file for session initiation file twenty times with differents seed values for random position. See Figure C.10. The first value represents the seed for random value in the initial position for the MN; second value corresponds to the overall average session initiation delay; the third value is the cantity of drop packets in this procedure; the fourth column shows the average session initiation wireless delay and the last column corresponds to the average wireless for the invite procedure delay.

```
seedPos:22 0.904561 0 0.00081 0.010609
seedPos:33 0.904501 0 0.000804 0.010433
seedPos:44 0.904577 0 0.000784 0.010499
seedPos:55 0.904661 0 0.000804 0.010495
seedPos:66 0.904485 0 0.000826 0.010489
seedPos:77 0.904653 0 0.000802 0.010627
seedPos:88 0.904533 0 0.000806 0.010487
seedPos:99 0.904337 0 0.000836 0.010381
seedPos:110 0.904353 0 0.000782 0.010401
seedPos:121 0.904575 0 0.000804 0.010511
seedPos:132 0.904517 0 0.000798 0.010595
seedPos:143 0.904283 0 0.000798 0.010441
seedPos:154 0.904419 0 0.000928889 0.010479
seedPos:165 0.904635 0 0.000784 0.010539
seedPos:176 0.904359 0 0.000784 0.010415
seedPos:187 0.904437 0 0.000917778 0.010453
seedPos:198 0.904525 0 0.000788 0.010437
seedPos:209 0.904519 0 0.000796 0.010531
seedPos:220 0.904421 0 0.000928889 0.010499
seedPos:231 0.904297 0 0.000824 0.010341
```

Figure C.9 File thINV-allD.dul for scenario 8 in Cooperative Model..