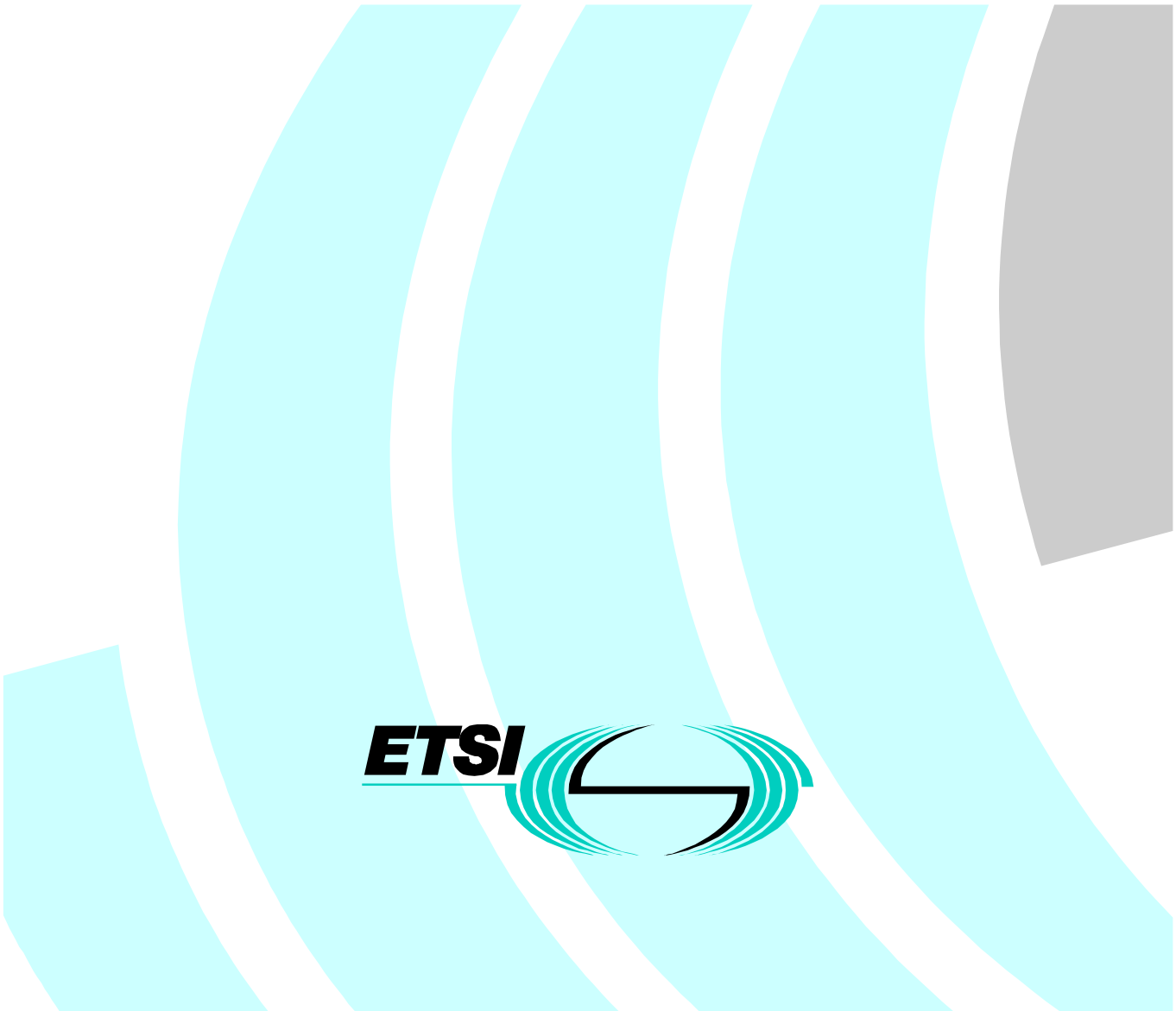
TR 101 334 V1.1.1 (1999-01)

Technical Report

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON); Verification and Demonstration Implementation (VDI); Implementers handbook and test reports; Scenario 1



Reference
DTR/TIPHON-06001 (cco00ics.PDF)

Keywords
internet, protocol, telephony, network

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Foreword

This Technical Report (TR) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

1 Scope

The present document introduces the activities of the Verification and Demonstration Interoperability (VDI) working group of TIPHON. The group is also known as Working Group (WG) 6. The information contained in the present document results from the practical experience gained through the implementation of TIPHON-Net and members implementing TIPHON services.

The present document describes the approach as well as the results of the activity and is for informative purposes only.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] IETF RFC 1876: "A Means for Expressing Location Information in the Domain Name System".

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ADSL	Asymmetrical Digital Subscriber Line
ARS	Address Resolution Server
DNS	Domain Name System
GK	Gatekeeper
ICMP	Internet Control Message Protocol
IP	Internet Protocol
IPS	Internet Phone Service
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
IVR	Interactive Vocal Prompt
LAN	Local Area Network
PC	Personal Computer
PICS	Protocol Implementation Conformance Statement
PIM	Protocol Independent Multicast
PSTN	Public Switched Telephone Network
RFC	Request for Comments
SCN	Switched Circuit Network
STF	Specialist Task Force
TCP	Transmission Control Protocol
TTL	Time To Live
UDP	User Datagram Protocol
UTC	Universal Time Coordinated
WAN	Wide Area Network

4 TIPHON-Net

4.1 Purpose

TIPHON-Net serves two main purposes:

- **Internal:** As a verification platform for the development of TIPHON technical specifications;
- **External:** As a demonstration platform showing TIPHON system inter-operability as wellas multi-vendor, multi-operator inter-operability of TIPHON compliant products, networks, and services.

Mission Statement

The primary purpose of TIPHON-Net is to serve as a verification platform for TIPHON specifications. This is required to guarantee the quality of TIPHON specifications.

The purpose of TIPHON-Net is not to provide a commercial or pre-commercial service or to be a platform for conformance testing of TIPHON products. The lifetime of TIPHON-Net shall be restricted to the span of TIPHON-Project.

Location

TIPHON-Net is set-up trans-nationally in order to demonstrate the most generic scenario.

The TIPHON-Net sites are described in clause 6.

4.2 Scope of TIPHON-Net

TIPHON-Net is a completely defined reference environment, composed of hardware, software and services. It is an experiment performed by multiple independent parties.

4.2.1 In-Progress Compliance

TIPHON-Net is based on the reference configurations and functional models developed by WG2. It should implement the latest versions of the TIPHON specifications.

4.2.2 Architecture and Equipment

The architecture of TIPHON-Net shall be approved by WG6 consensus. Equipment, Services, and Networks used within TIPHON-Net are and will be provided by TIPHON-members free of charge and/or royalties for the purpose of this ETSI project. End users should not be charged for using TIPHON-Net.

4.2.3 Use by members

TIPHON members should use TIPHON-Net as a platform for service trials in order to test TIPHON implementations under real working conditions.

4.3 Deliverables

WG 6 will produce a deliverable for each phase of TIPHON summarizing the results of TIPHON-Net and giving guidance to implementers of TIPHON technology.

5 Topologies

This section lists various network topologies that may be used to assemble TIPHON networks. The topologies are listed according to TIPHON scenario.

5.1 Elements

The following section details the equipment that is present to build a TIPHON network. As new scenarios are defined this section will be modified.

5.1.1 IP/SCN Gateways

Gateways are devices that bridge IP telephony and SCN telephony. These devices might be a computer running some software with appropriate telephony interface hardware or it may use another configuration. A gateway may provide for up to x simultaneous voice lines to be active, and require some telephony interfaces and protocols (such as EuroISDN running over an E1 link) to work.

5.1.2 Gatekeepers

A gatekeeper is software running on some server platform that allow to control networks. It is the logic TIPHON network.

5.1.3 IP Terminals

Software and/or hardware running on some IP-enabled platform.

5.1.4 SCN Terminals

Conventional telephone equipment connected to an SCN.

5.2 Scenario 1

TIPHON scenario 1 details how a TIPHON terminal (PC for example) communicates with telephone equipment connected to an SCN. Call Set-up is assumed to always originate on the IP side. Calls that originate on the SCN side are covered by another scenario.

5.2.1 Single LAN / Single Administrative Domain

The simplest TIPHON network that can be build is made out of only one LAN segment, containing all the relevant IP equipment, connected to an SCN.

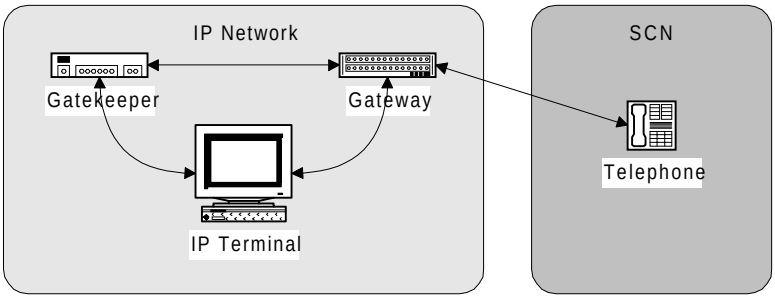


Figure 1: Single LAN Segment Topology

Such a network might be useful for simple Intranets, as the IP terminal may have the functionality of both a Phone and a usual desktop computer.

5.2.2 Multiple LANs / Single Gatekeeper / Single Administrative Domain

This topology will happen when building an Intranet (intra-company WAN), enabling TIPHON services to be used.

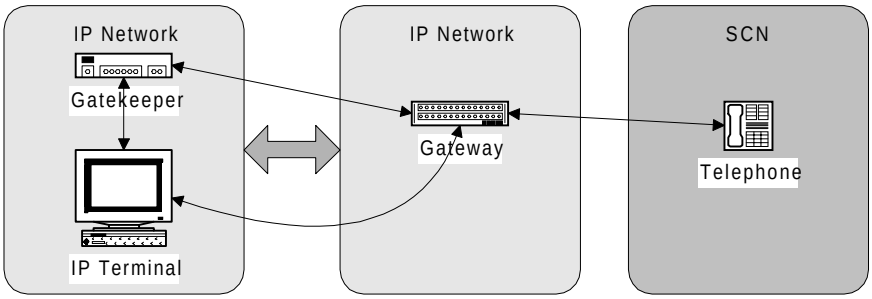


Figure 2: Inter-Network Topology / One Administrative Domain

Because some sites in the Intranet may be closer to the destination SCN terminal, this set-up may reduce communication costs.

5.2.3 Multiple LANs / Multiple Gatekeepers / Single Administrative Domain

Similar to the previous set-up, but allowing greater flexibility by deploying multiple gatekeepers, each controlling a LAN segment.

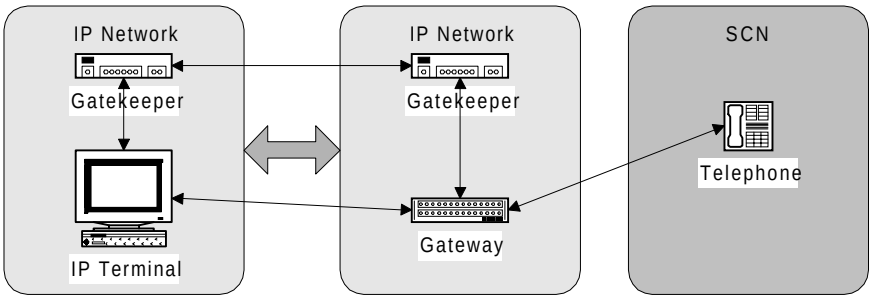


Figure 3: Inter-Network Topology / Two Administrative Domains

This set-up will allow a network administrator more flexibility in controlling the specific traffic in every LAN segment and every LAN inter-connect.

5.2.4 Multiple LANs / Multiple Administrative Domains

When connecting administrative domains, it is required to enable inter-domain functions. This most probably details some pre-mediated contract and periodical reconciliation.

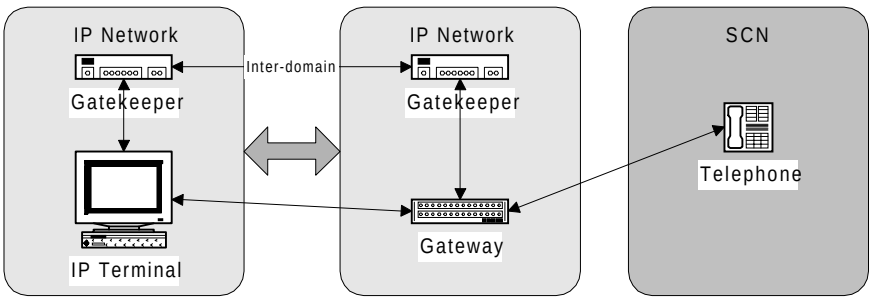


Figure 4: Inter-Domain topology

5.2.5 Multiple LANs / Multiple Administrative Domains / Broker

When two administrative domains wish to connected and do not have a pre-mediated contract and inter-domain agreement, they may do so via a broker.

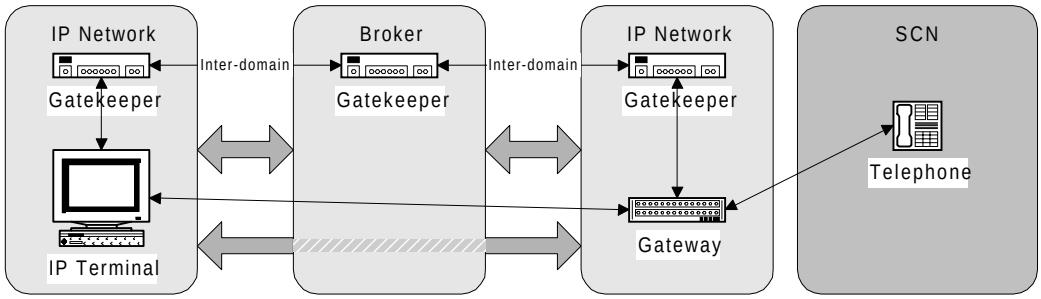


Figure 5: Using a broker to establish trust

Obviously each of the administrative domains will have to enable a pre-mediated contract with the broker itself. Such a service is also called a "clearing-house".

5.2.6 Spill-over and redundancy

To enable better reliability of service, a network may deploy spill-over and/or redundant IP links. The decision regarding which is the main and which is the backup link is up to the administrator of the network.

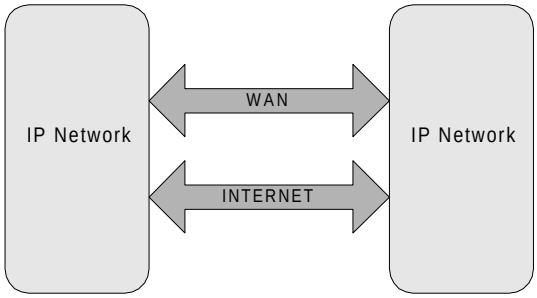


Figure 6: Multiple IP links connecting two networks

The gatekeepers in such a network setup will need to "know" about the managed or unmanaged properties of each link.

5.2.7 Roaming

An IP terminal is considered roaming when belonging to one administrative authority (*HOME*), it registers with a gatekeeper belonging to another administrative authority (*VISITED*), and can perform the following actions:

- ask *HOME* to authorize some action (such as making a call);
- originate services from the *VISITED* network and use quality of service mechanisms available on that network if authorized by both the *HOME* administrative entity and the *VISITED* administrative entity;
- receive service as usual - need to update *HOME* how to locate the entity;
- be billed for resources used at *VISITED* network by *HOME* administrative authority.

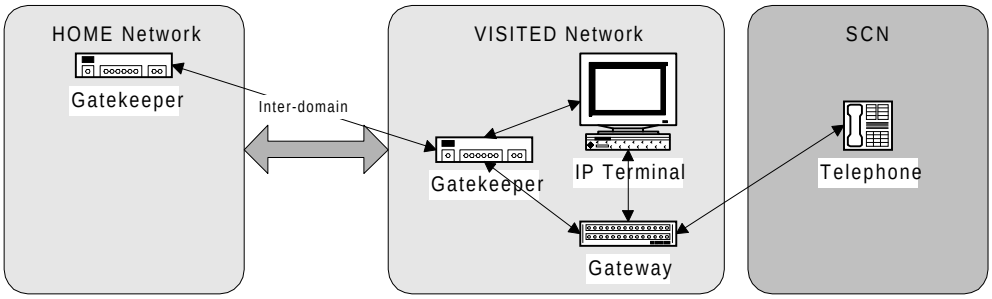


Figure 7: Roaming

It is assumed that some "Roaming Agreements" will have to be set-up before such service could take place. This is similar in concept to the way GSM networks operate.

6 TIPHON-Net Deployment

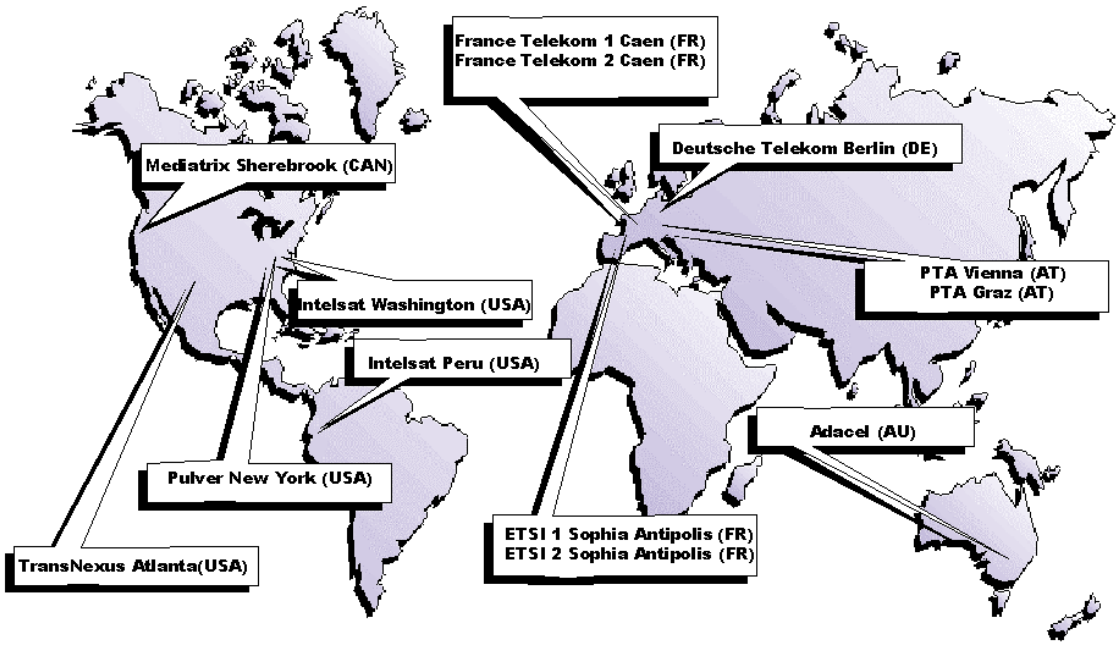


Figure 8: Current TIPHON-Net Deployment

A TIPHON-Net WWW server containing site information has been set-up by Infonova. There sites-owners have access to all the information required to configure the gateways for all TIPHON scenarios. The site can be accessed at http://www.infonova.at/tiphonnet/.

6.1 Current Sites

6.1.1 ETSI

6.1.1.1 General

The ETSI TIPHON-Net site will need to provide as much flexibility as possible to allow it to be configured for a wide range of possible tests. It currently hosts a single gateway with 2 voice lines connected to the public Internet, and a second 2-line gateway connected to a private 128 Kbit/sec frame-relay link to CNET France Telecom site in Caen.

6.1.1.2 Configuration

Table 1: Gateway 1: Sophia Antipolis, France

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.2
Hardware:	Pentium 233Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	2
SCN Interface:	Analog
Host Name	tiphon1
IP Address:	212.234.161.27 / 255.255.255.0
Default Gateway:	195.221.129.250 (etsi-router IP address allowing access to Cegetel and Transpac the french Internet Service Providers
DNS servers	212.234.161.10, 212.234.161.14, 212.234.161.30
Routing **This routing information forces the gateways networks to use the Frame Relay route when addressing the France Telecom site in Caen.**	Routing : 194.199.139.248 (France Telecom - CAEN – 02 Gateway) 255.255.255.255 212.234.161.17 (tiphon-router) Routing : 194.199.139.242 (France Telecom - CAEN – 01 Gateway) 255.255.255.255 212.234.161.17(tiphon-router)
Phone Numbers of the 2 lines	+33 4 92 94 49 16, +33 4 92 94 49 17
Access	
Gateway Name:	ETSI Vocaltec Gateway 1
Service/Country Code(s):	33
Area Code(s):	01, 04, 05, 06, 07, 08
Priorities Table:	33-01 (priority order : FT01, FT02, etg2) 33-02 (priority order : FT01, FT02) 33-03 (priority order : FT01, FT02) 33-04 (priority order : etg2) 33-05 (priority order : etg2)
Contact	
Phone near the Gateway:	+33 4 92 94 4922
Test Phone:	+33 8 36 69 55 55 (airport arrivals and departures IVR) +33 8 36 68 20 22 (cinema information IVR)

Table 2: Gateway 2: Sophia Antipolis, France

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.2
Hardware:	Pentium 300Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	2
SCN Interface:	Analog
Host Name	tiphon2
IP Address:	212.234.161.32 / 255.255.255.0
Default Gateway:	212.234.161.254(etsi-router IP address allowing access to Cegetel and Transpac , the french Internet Service Providers
DNS servers	212.234.161.10, 212.234.161.14, 212.234.161.30
Phone Numbers of the 2 lines	+33 4 92 94 42 63, +33 4 92 94 42 65
Access	
Gateway Name:	ETSI Vocaltec Gateway 2
Service/Country Code(s):	33
Area Code(s):	01, 04, 05, 06, 07, 08
Priorities Table:	33-01 (priority order : FT01, FT02, etg1) 33-02 (priority order : FT01, FT02) 33-03 (priority order : FT01, FT02) 33-04 (priority order : etg1) 33-05 (priority order : etg1)
Contact	
Phone near the Gateway:	+33 4 92 94 4922
Test Phone:	+33 8 36 69 55 55 (airport information IVR) +33 8 36 68 20 22 (cinema information IVR)

Table 3: Router configuration, Sophia Antipolis, France

Configuration	
Software:	IOS
Hardware:	CISCO Router 3620
Number of modules:	1
WAN boards:	1 WAN ISDN BRI board 1 WAN serial board
LAN boards	1 LAN Ethernet board 10 Mbits/s
Host Name	tiphon-router
IP Address:	212.234.161.17/255.255.255.0

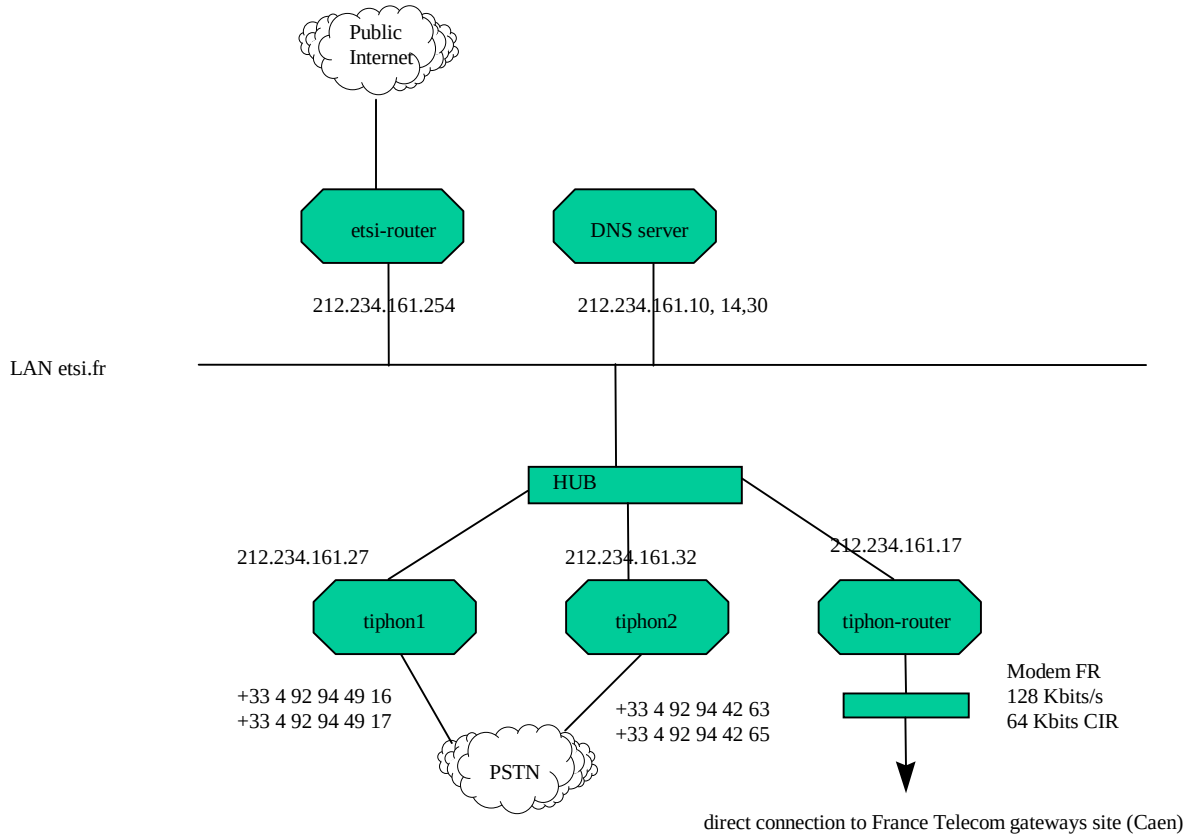


Figure 9: Configuration of the ETSI Lab

6.1.1.3 Usage

The ETSI site exists for two main reasons:

1) to allow STF 114 to verify TIPHON specifications by running actual tests; and

2) to allow TIPHON members to run tests with a highly configurable external site.

Schedule of tests using the ETSI site will be administered by STF 114. All scheduling disagreements will be decided on by the WG6 Chairman.

6.1.1.4 Test plan

Table 4: Test plan for ETSI TIPHON-Net Site

#	Description	Start	End	Status Reports
1	Verification of WG5 (QoS) Deliverable measurement points (DTR/TIPHON-05001 V1.x.x 1998-xx)	23-03-98	Project Duration	March 11th, 1998: Waiting for WG5-Chairman approved Deliverable. March 17th, 1998: Received stable Deliverable, Waiting installation of basic TIPHON-Net ETSI Lab.
2	Support Siemens Test Plan (subclause 9.1)	23-03-98	Project Duration	March 17th, 1998: Waiting installation of basic TIPHON-Net ETSI Lab.
3	Support PTA/Infonova Test Plan (subclause 9.2)	23-03-98	Project Duration	March 17th, 1998: Waiting installation of basic TIPHON-Net ETSI Lab.
4	Support TransNexus (reconciliation) Test (subclause 8.1)	23-03-98	Project Duration	March 17th, 1998: Waiting installation of basic TIPHON-Net ETSI Lab.
5	STF 114: TIPHON-Net Tests with Ping Plotter V2.0 and Pathchar	05-08-98	Project Duration	August 20th, 1998: Temporary Document 40 at the TIPHON Meeting in Portland
6	STF 114: Updated TIPHON-Net Tests with Pathchar New Tests with VisualRoute	01-09-98		October 15th, 1998 Temporary Document 68 at the TIPHON meeting in Tel Aviv

6.1.2 France Telecom: Caen, France

Table 5: Gateway: France Telecom, Caen

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.1a Dialogic Driver 97/8
Hardware:	Pentium 166Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	1
SCN Interface:	Analog
IP Address:	194.199.139.242
Access	
Gateway Name:	France Telecom - CAEN - 01
Phone number of the PSTN line:	+33 2 31 73 83 77
Priorities Table:	33-01 (priority order : etg1, etg2, FT02) 33-02 (priority order : FT02) 33-03 (priority order : FT02) 33-04 (priority order : etg1, etg2) 33-05 (priority order : etg1, etg2)
Service/Country Code(s):	33
Area Code(s):	01, 02, 03, 06, 08
Contact	
Phone near the Gateway:	+33 2 31 75 90 35
Test Phone:	+33 8 36 69 55 55 (airport arrivals and departures IVR) +33 8 36 68 20 22 (Cinema information IVR)

Table 6: Gateway: France Telecom, Caen

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.1a Dialogic Driver 97/8
Hardware:	Pentium 166Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	1
SCN Interface:	Analog
IP Address:	194.199.139.248
Access	
Gateway Name:	France Telecom - CAEN - 02
Phone number of the PSTN line:	+33 2 31 73 83 17
Priorities Table:	33-01 (priority order : etg1, etg2, FT01) 33-02 (priority order : FT01) 33-03 (priority order : FT01) 33-04 (priority order : etg1, etg2) 33-05 (priority order : etg1, etg2)
Service/Country Code(s):	33
Area Code(s):	01, 02, 03, 06, 08
Contact	
Phone near the Gateway:	+33 2 31 75 90 35
Test Phone:	+33 8 36 69 55 55 (airport arrivals and departures information vocal server) +33 8 36 68 20 22 (cinema information vocal server)

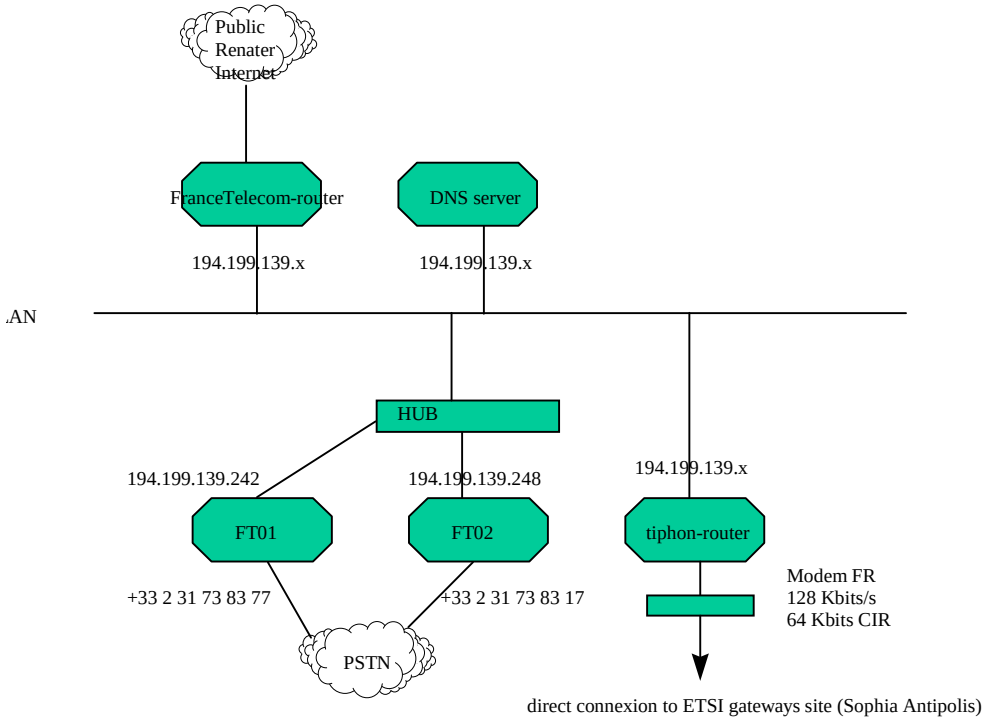


Figure 10: Configuration of the France Telecom Lab in Caen

6.1.3 Austria Telecom

PTA Site is connected in the following was:

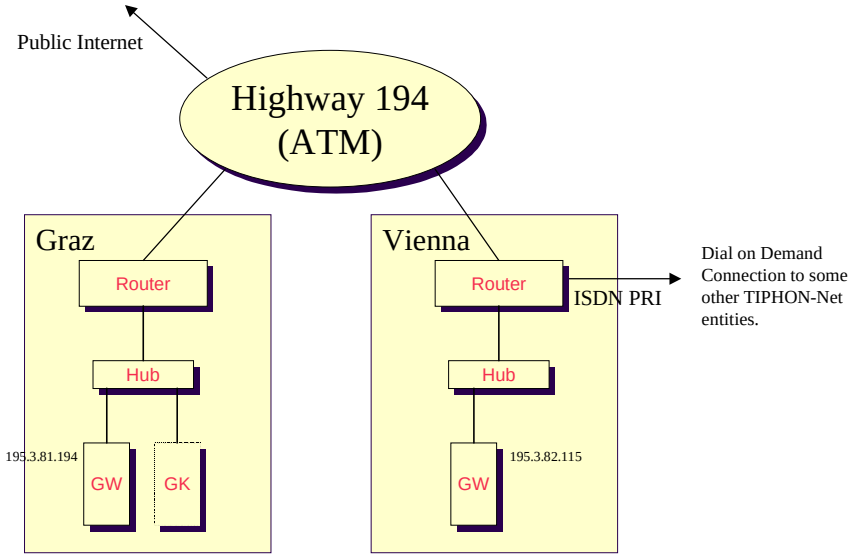


Figure 11: PTA TIPHON-Net sites connection to public internet and other TIPHON-Net sites

6.1.3.1 Configuration

Table 7: Gateway: Vienna, Austria

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.1a Dialogic Driver 97/8
Hardware:	Pentium 166Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	2
SCN Interface:	Analog
IP Address:	195.3.82.115
Access	
Gateway Name:	TIPHON Net Gateway 1
TIPHON User:	TIPHON PTA Vienna
PIN Code:	23232323
Service/Country Code(s):	43
Area Code(s):	1, 2, 5..9, 32..39, 41..44, 46..49
Contact	
Phone near the Gateway:	+43 1 797534194
Test Phone:	+43 1 1562 (Music)

Table 8: Gateway: Graz, Austria

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.1a Dialogic Driver: NT DNA version 1
Hardware:	Pentium 166Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	2
SCN Interface:	Analog
IP Address:	195.3.82.115
Access	
Gateway Name:	TIPHON Net Gateway 1
TIPHON User:	TIPHON PTA Graz
PIN Code:	89898989
Service/Country Code(s):	43
Area Code(s):	315
Contact	
Phone near the Gateway:	+43 316 715440 120
Test Phone:	+43 316 1562 (Music)

6.1.3.2 Test Plan

Table 9: Test plan for PTA TIPHON-Net Site

#	Description	Start	End	Status Reports
1	Connection Quality Test	23-03-98	Project Duration	March 17th, 1998: Waiting installation of basic TIPHON-Net ETSI Lab.
2	Call Set-up Time Test	23-03-98	Project Duration	March 17th, 1998: Waiting installation of basic TIPHON-Net ETSI Lab.

6.1.4 Pulver.Com: New York, USA

Table 10: Gateway: Pulver.Com, New York

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.1a Dialogic Driver 97/8
Hardware:	Pentium 166Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	1
SCN Interface:	Analog
IP Address:	204.7.54.41
Access	
Gateway Name:	jeff1
Phone number of the PSTN line:	+1 516 773 6331
Routing Table:	
Service/Country Code(s):	1
Area Code(s):	212, 516, 718, 888, 914
Contact	
Email:	jeff@Pulver.COM
Test Phone:	+1 212 555 12 12 (international whitepages service)

6.1.5 TransNexus: Atlanta, USA

Table 11: Gateway: TransNexus, Atlanta

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.1a Dialogic Driver 97/8
Hardware:	Pentium 166Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	1
SCN Interface:	Analog
IP Address:	208.224.203.242
Access	
Gateway Name:	TransNexus - Atlanta
Phone number of the PSTN line:	+1
Routing Table:	
Service/Country Code(s):	1
Area Code(s):	404, 678, 770
Contact	
Email :	stephen.thomas@transnexus.com
Test Phone:	

6.1.6 Mediatrix: Sherebrook, Canada

Table 12: Gateway : Mediatrix, Sherebrook

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.1a Dialogic Driver 97/8
Hardware:	Pentium 166Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	1
SCN Interface:	Analog
IP Address:	205.237.248.128
Access	
Gateway Name:	MXVCLTGW1
Phone number of the PSTN line:	+1 516 773 6331
Routing Table:	
Service/Country Code(s):	1
Area Code(s):	81934, 81956, 81982
Contact	
Email :	fmenard@mediatrix.com
Test Phone:	

6.1.7 Deutsche Telecom: Berlin, Germany

The DTAG site is up and running. Currently the VocalTec Gateway 3.1a is used. Use of ISDN-Router is being investigated. MICOM sites could be available in future. No further details are available.

Table 13: Gateway: Deutsche Telecom, Berlin

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.1a Dialogic Driver 97/8
Hardware:	Pentium 166Mhz, 64MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-lines
Number of Voice Lines:	1
SCN Interface:	Analog
IP Address:	141.39.12.150
Access	
Gateway Name:	TIPHON Berkom
Phone number of the PSTN line:	+49
Routing Table:	
Service/Country Code(s):	49
Area Code(s):	30, 6151
Contact	
Email :	i.kliche@berkom.de
Test Phone:	

6.1.8 Adacel Gateway : Melbourne, Australia

Table 14: Gateway Adacel, Melbourne

Configuration	
SoftwarAdacele:	Windows NT SP3, VocalTec Gateway 3.2
Hardware:	Pentium II 300Mhz, 64MB RAM Voice Card, Dialogic D 41/ESC, 4 lines
Number of Voice Lines:	2
SCN Interface:	Analog via PBX
Host Name	-
IP Address:	203.36.26.148
Default Gateway:	
DNS servers	203.36.26.146
Phone Numbers of the 2 lines	
Access	
Gateway Name:	ADACEL_GATEWAY_MELB
Service/Country Code(s):	61
Area Code(s):	3,13
Contact	
Phone near the Gateway:	+61 3 9596 2991
Test Phone:	+61 131223

6.1.9 INTELSAT Gateway, Washington

Table 15: Gateway Intelsat, Washington

Configuration	
Software:	Windows NT SP3, VocalTec Gateway 3.1a
Hardware:	Pentium 200Mhz, 32MB RAM, SCSI HD Voice Card, Dialogic D 41/ESC, 4-analog FXO lines
Number of Voice Lines:	1
SCN Interface:	Analog via PBX
Host Name	-
IP Address:	208.202.21.56
Default Gateway:	208.202.21.49
DNS servers	208.202.21.21
Phone Numbers of the 2 lines	
Access	
Gateway Name:	INTELSAT_GW_02
Service/Country Code(s):	1
Area Code(s):	202
Contact	
Phone near the Gateway:	+1 202 944-7937 ; +1 202 944-7233
Test Phone:	+1 202 944-7003

7 Using TIPHON-NET

7.1 Phone to Phone

First you need to know a phone number of the phone lines that connects a local gateway to the PSTN. Local gateway means that it is closed to you in order to be charge for only a local call.

Secondly, you dial the gateway phone line number. The gateway, through its IVR (interactive vocal prompt) will prompt you to dial either a regular phone number (with area code or country code if needed) or an IP address (the four segments of an Ipv4 address has to be separated by # symbol). Numbers are terminated with a star ("*").

For now it is only possible to reach the USA, France, Germany Austria, Australia, Canada and Peru.

7.2 PC to Phone

First you need to get the Iphone5 client software, you can download it from Vocaltec web site (www.vocaltec.com), which is freely available to TIPHON members.

Once you have installed the software on your IP terminal, you should ask the administrator of TIPHON NET (guenther.koerbler@etsi.fr) to generate the authorization file for your IP terminal. The IPS file would be sent to you by mail, once you have received it, you will need to install it from your IP terminal to use TIPHON-Net.

8 TIPHON-related Equipment & Software

8.1 Gateways

8.1.1 VocalTec

VocalTec Communications offers a free 2-line analog gateway and terminal software to TIPHON members. Details on this offer can be found in TIPHON-06 Temporary Document 83 (see Bibliography).

The following information is required for the connection of a VocalTec Gateway to TIPHON-Net: *Location, IP Address, Gateway Code, Access Code, Country code(s) supported by the gateway, dial out permissions (area codes), technical contact point phone and e-mail.*

IPS files (configuration file for VocalTec's Internet Phone terminal software) for each Gateway should also be provided.

8.2 Terminals

8.2.1 VocalTec: Internet Phone

VocalTec is making its client software (Internet Phone) TIPHON compliant and expect it to be widely used. VocalTec offers Internet Phone version 5 free of charge to TIPHON-Net sites. Details on this offer can be found in TIPHON-06 Temporary Document 83 (see Bibliography).

8.3 Network Equipment

8.3.1 Network Performance evaluation software: PTA

PTA will develop a software that can be installed on TIPHON-Net sites in order to gather statistics about the network performance which is achieved in TIPHON-Net. PTA will provide an evaluation of the data collected.

9 TIPHON-related Services

9.1 Reconciliation service: TransNexus

9.1.1 Introduction

TransNexus is pleased to offer its reconciliation services free of charge to any operators participating in ETSI TIPHON-Net. Use of these services is strictly voluntary on the part of any operator; some TIPHON-Net operators may choose to use the service while others are free to decline. The following sections describe the benefits of the service, the procedures for establishing the service, and the service policies.

9.1.2 Benefits of the Service

Operators using the TransNexus reconciliation service will receive the following benefits:

- Reconciled usage reports and statistics for their gateways' traffic, in both summary and detailed form, updated every 24 hours.
- Optionally, simulated financial information reflecting the amount of funds owed to or from other operators, also updated every 24 hours. (In order to provide this service for any particular transaction, TransNexus needs to be given simulated settlement rates and other terms from all parties.)

- Monthly accounting statements reflecting the net traffic to or from each of their gateways. As with the daily updates, TransNexus can provide the information as pure usage (e.g. number of phone calls and minutes) or, optionally, as simulated financial data (amount owed to or from other operators).

9.1.3 Establishing service

In order to establish service with TransNexus, a TIPHON-Net operator needs to provide the following:

- FTP access (password protected, if desired) to their usage data for each participating gateway;
- detailed description of the file format of their usage data;
- a technical contact to assist with any problems encountered in accessing usage data;
- optionally, copies of bilateral agreements outlining simulated settlement rates and terms between operators.

TransNexus will provide a single point of contact (supporting voice, fax, and email) to assist operators in establishing service.

9.1.4 Service Details

At 00:00 UTC each day, TransNexus will collect usage reports from each participating gateway and reconcile the usage details with peer gateways participating in the service. Before 00:00 UTC the following day, TransNexus will update usage information reflecting the newly collected data. Each operator's usage information will be available from the Internet via a password-protected account.

If it is desired by WG6, TransNexus can provide a special account to STF members allowing them access to information from all participating gateways. Usage data will be available in both summary and detailed form, and will include number and duration of all calls.

TransNexus will also report any calls that could not be reconciled (either because the peer gateway's usage data did not agree, or because the peer gateway was not participating in the service.) Calls that did not reconcile can be re-submitted at a later date.

On the 9th of each month, TransNexus will provide a consolidated statement to each participating operator. The statement will summarize all reconciled usage data for the previous month.

If all operators participating in a particular call have elected to provide TransNexus with copies of their bilateral agreements reflecting simulating settlement rates and other terms, TransNexus will also include simulated financial data with both daily and monthly statements. Each operator may select a currency in which their financial data is calculated. TransNexus standard currencies include:

Table 16: Currencies used by the Reconciliation Service

AUD	Australia Dollar	**GBP**	British Pound
BEF	Belgian Franc	**HKD**	Hong Kong Dollar
CAD	Canadian Dollar	**ITL**	Italian Lire
CHF	Swiss Franc	**JPY**	Japanese Yen
DEM	Deutsche Mark	**NZD**	New Zealand Dollar
ECU	European Currency Unit	**SGD**	Singapore Dollar
ESP	Spanish Peseta	**TWD**	Taiwan Dollar
FRF	French Franc	**USD**	United States Dollar

Other currencies may be supported upon request.

If operators in a transaction elect to use different currencies, TransNexus will still report financial data in each operator’s currency of choice. For currency exchange rates, TransNexus will use the mid exchange rate (average of bid and ask rates) published by Reuters of London at 12:00 UTC on the day of the transaction (where "day" is defined as 00:00 UTC to 23:59 UTC).

If the operators' bilateral agreements specify a method of currency exchange, TransNexus will seek to accommodate that arrangement within its reconciliation process.

The following TIPHON-Net sites showed interest in the service offered by TransNexus and wish to experiment with that service for the purpose of TIPHON-Net:

1) PTA;

2) VocalTec;

3) Ericsson;

4) ETSI.

This services verifies a scenario which is currently discussed in WG 2 "Architecture".

10 Tests

10.1 Evaluation of service provision: Siemens

A major objective of application trials is to test and evaluate the necessary technical platform for the procurement of new services with pilot users in a real-life environment. In addition to the technical aspects, an evaluation of the users' response to and acceptance of the offered services is of great importance for a successful market introduction and deployment.

Some of the key questions one might ask in this respect are the following:

- What are the user needs (e.g., in terms of his business process/application scenario) that lead to the demand for and acceptance of a certain new service?

- What are the critical parameters describing service quality from a user's point of view (e.g., delay, intelligibility [mean opinion score])?

- What is the typical usage profile (e.g., frequency, duration) to be expected with respect to the new service?

- What is the users' willingness to pay for the new service?

- What are the driving forces in order to establish the market for the new service?

These parameters could be used to get a detailed insight into the viability of introducing new services in a mass deployment.

We (Siemens) offer to analyse these and additional parameters in an application evaluation trial together with the TIPHON project partners and a friendly end user community. The results obtained could serve as a valuable guideline into this new market segment.

In the following we provide an overview about typical methodologies for the evaluation of new services. The development of these methodologies is based on experience from EU-projects dealing with telecommunications applications, on a multimedia trial with Deutsche Telekom AG for introducing ADSL technology and on a Siemens internal Tele-collaboration project. A similar approach could be customized as demand necessitates for the TIPHON project in order to evaluate Voice-over-IP-Services.

10.1.1 Goals of the evaluation

10.1.1.1 Usability of the service

The goal should be to produce a usable service. In defining a usable service, we specify what the requirements are with respect to:

- Learn-ability;
  How easy is it to learn to use the service.

- Efficiency of use;
  Achieve high productivity using the service.

- Memory-ability;
  Handling the service should be easy to remember once you have learned how to use it.

- Error susceptibility;
  Users should make few errors and be able to easily recover from them. An error is defined as an action that does not accomplish the desired goal. (That is, an error does not just occur when an error message flashes on the screen or an error signal is acoustically fed to the user).

- Satisfaction;
  How pleased the user is with the service.

10.1.1.2 Acceptance and attractiveness of new services

In defining a special service and the necessary equipment to support it, the benefit for the users, the acceptance by the users, the attractiveness to the users and the willingness to pay of the users have to be found out. Only services with an acceptable cost/benefit-profile for both subscribers and service providers will be successful. Also their ability to compete against established services has to be considered.

The goal is to get a rough estimate of the potential cost/benefit and user acceptance. The user acceptance will mainly be investigated by performing interviews to gather feedback from the users, guided by pre-defined tools like questionnaires.

10.1.1.3 Usage profile

The objective of assessing the users' behaviour by building up a service usage profile is very well met by performing an automatic monitoring of user actions and corresponding data accumulation. The advantage of an automatic monitoring is that all relevant actions of the users are permanently observed and evaluated automatically without additional effort for the user. A detailed usage profile, as gained by the automatic monitoring, could be used to dimension a system for optimum performance.

10.1.1.4 Trial support and realization of the evaluation

Our consultancy within a trial contains the following steps: Trial preparation, trial coaching, trial evaluation and exploitation of results.

Table 17: Trial Support and participating bodies

What	With	Who
Definition of goals and setting up a project plan	Workshop	WG 6
Selection of users (who joins the trial and why?) and assessment of possible application scenarios	User profile checklist and user polling, application tests (demonstrator)	WG 6
Polling of expectations in new services from the users' side	Questionnaire for collecting the users expectations and demand	WG 6 esp. potential service provider
Support for introduction and instruction of usage: What should the user know for using the system? Who is the person that could be asked when there are problems (Hotline)?	Integration of VoIP-services into the network infrastructure. User introduction workshops, usage guide (reference manual for most important functionality's)	WG 6, TIPHON technical partner for technical support. Potential service provider for user support (1 person for 50 users)
Coaching during the experimentation phase (continuous working and usage of the system). Details see next table	User interviews. Measurement of user operations with an automatic monitoring tool and special evaluation sheets	WG 6, esp. technical partner and potential service provider
Evaluation and exploitation of results concerning the following aspects: used technology (CPE and network), cost-benefit-analyses, application main focus (user acceptance), identification of typical usage scenarios and business opportunities, conclusions for the users organization and business processes, conclusions for equipment vendors and potential service providers	Evaluation of operation and interviews. Assembling and interpretation of results and recommendations for the follow- up procedure. Assessment of individual performance measures. Recommendations for a mass deployment	WG 6, esp. technical partner and potential service provider

During the trial (experimentation phase), the following service related experiments with the corresponding methodologies are applicable:

Table 18: Service Experiments

Methodology ⇒ Service related experiments ⇓	User interview	Automatic monitoring
Characterization of users and examination of attitudes and practices	†	
Collection of usage information		†
Determination of service rush-hours		†
Reliability measurement		†
Learn-ability & memory-ability testing	†	
Error susceptibility testing	†	†
Satisfaction testing	†	
Efficiency of use testing	†	

10.2 PTA

We (PTA) want to test the connectivity in two different ways. At first we want to count the "hops" between one TIPHON-Net entity and all the other TIPHON-Net entities. The second connectivity test is for measuring the propagation delay of IP packets between the entities. The tests shall be made to identify the need of direct ISDN connections.

10.2.1 Connection Quality Test (PTA/1)

To test the IP packet propagation delay from one TIPHON-Net entity to all the other TIPHON-Net entities we want to use the following IP protocols:

- ICMP (Ping);
- UDP (Echo, Chargen);
- TCP (Echo, Chargen).

All the TIPHON-Net entities shall support "Simple TCP Services" like echo and chargen. We expect diagrams for every single protocol for all the TIPHON Net entities that look like:

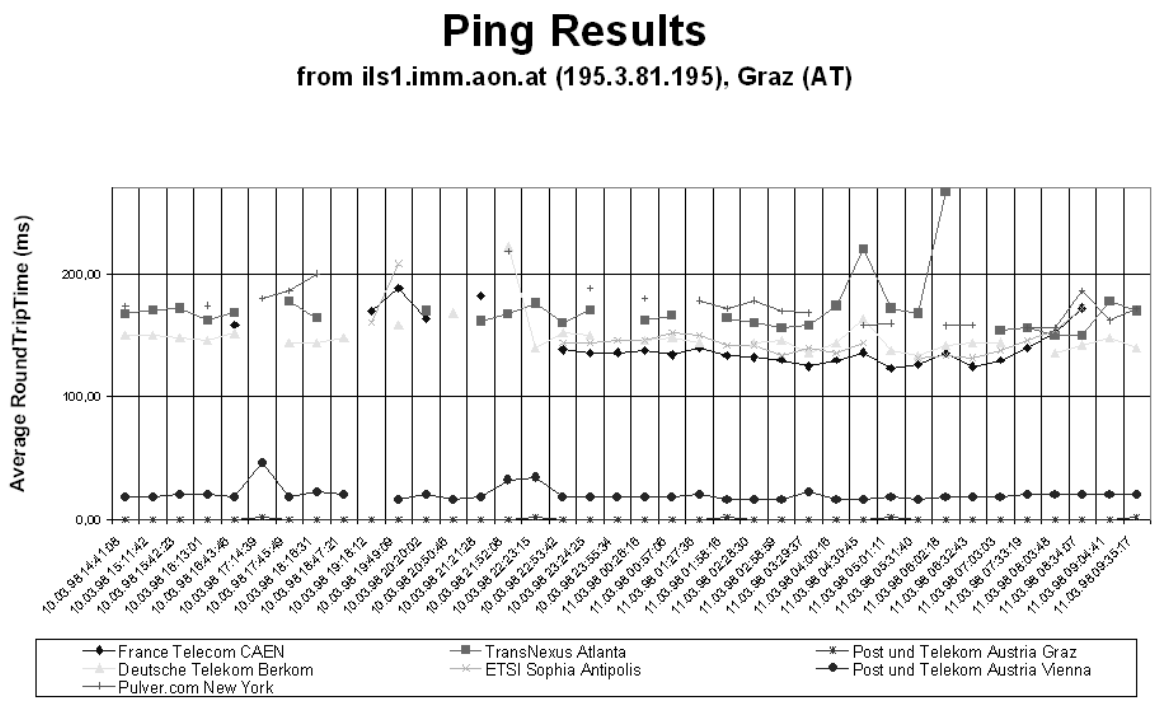


Figure 12: Statistics Gathering on TIPHON-Net sites

10.2.2 Call set-up time test (PTA/2)

At first we have to establish a conventionally telephone connection. Then we dial a second telephone using the PC and look how long the call setup was timed. One result requires several measurements per session. A session shall be held several times a day.

After the direct ISDN connections are established we want to continue the Setup Time test to compare the different results.

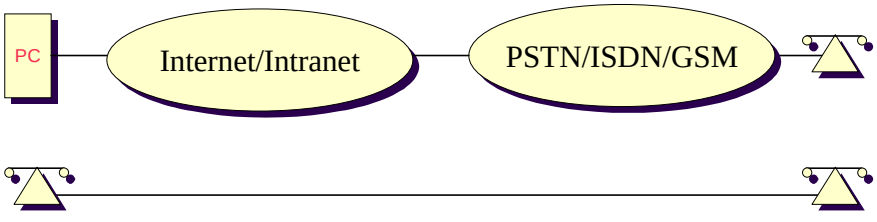


Figure 13: Statistics Gathering on TIPHON-Net sites

11 Experimental services

11.1 Scenario 2 address resolution server (France Telecom/CNET)

11.1.1 Design objectives

We (France Telecom/CNET) identified mainly 3 design objectives:

a) optimize the cache efficiency at the client level and reduce latency. An efficient cache scheme is very easy to imagine for local IP clients, however, for national gateways for instance, it is not obvious to be as efficient because the requests will not be as focused and repetitive;

b) limit the workload of the root ARS servers and have a scalable architecture;

c) allow the reuse of the ARS servers for other technologies than H.323. This should ease the attribution of a global service code, since it could be shared between several technologies.

a) lead us to store prefixes in the ARS rather than individual numbers (although individual numbers are still allowed).

For instance a request such as:

"Which Home Gatekeeper handles call management for phone number 1234567890 ?"

will be answered by the ARS by:

"All numbers of the form 12345x are handled by Home Gatekeeper 190.193.3.56".

The other constraint, to reduce the latency of the resolution, imposes to reduce the number of hierarchy levels in the ARS framework (unlike DNS), while preserving the scalability.

b) can be met with two strategies:

- Only store large blocks at the root ARS level. This is desirable but we don't think it can be enforced, since IP telephony may lead small corporations or even individuals to maintain their own Home Gatekeeper. Another issue with having large blocks at the ARS level is that by having blocks of n digits, we limit the possibility of hashing to the first 12 – n digits, and this reduces the homogeneous repartition of data between the root ARS.

- Distribute the data among many root ARS using a hash of the requested phone number. However the number of root ARS needs to be kept manageable.

We propose a compromise allowing to store blocks of 6 digits and hashing on the first 6 digits. Hashing on 6 digits (using an algorithm similar to the one specified in PIM sparse mode RFC) should provide a reasonably homogeneous spreading of data among the root ARSs, up to a few 100s ARSs (100 is probably the upper limit from a manageability point of view).

For example to resolve the phone number 123456781234 to a HOME GK, the client chooses the appropriate ARS by hashing 123456. This way if the ARS happens to store all 123456x numbers in a single block, all the relevant requests will reach the appropriate ARS.

c) lead us to introduce resource type identifiers in the ARS, so that other resources than H.323 GK could be stored.

11.1.2 Scalability

11.1.2.1 Pointer resource

Depending on the business model that will prove most successful, either the ARS will have to store only large blocks (in the case the home GK are handled only by large ISPs and telcos), or many small blocks or even individual numbers in case small corporations or even individuals maintain their own home GK.

The latter case is a scalability challenge for the proposed ARS scheme, because each ARS (supposing we cannot expand the number of root ARSs beyond a hundred) will have to handle millions of records.

To solve this issue we propose to impose a minimal block size for the records that will be stored at the root ARS level and to introduce an ARS pointer resource, effectively introducing a level of hierarchy.

For instance we might have the following case:

"What is the home GK for 123456123456 ?"

and the relevant root ARS answers:

"for 12345612x numbers, ask to secondary ARS 132.132.132.132".

and the secondary ARS answers:

"all 12345612345x numbers are handled by home GK 145.223.213.3".

11.1.2.2 Study for 100 million numbers and 100 root ARS

If the hash-code works the way it is supposed to, each ARS will be responsible for about 1 million numbers. If about 80 % of the users are subscribers of large ISPs or operators, those users will be concentrated on just a few records, so the remaining 20 % will account for the bulk of the records, which therefore might be up to 200 000 records per ARS.

If the server has to handle about 5 millions calls per day (5 calls per number per day), about 80 % of those calls will be handled by the cache of the client resolver (those in large blocks will probably be in the cache), so the server will only receive requests for the remaining 20 %, which amounts to 1 million requests per day per ARS, on a database of 200 000 records.

If we can implement such an ARS, then the scheme works with no further level of hierarchy.

Otherwise, we could impose a minimal block size of 3 digits at the ARS level, and only store a pointer to secondary ARSs for numbers in those blocks. This divides the average number of records by 1 000 and each ARS now has to answer 1 million requests per day on 2 000 records: we know this works (even on the current alpha version).

11.1.2.3 Experimental Implementation

This alpha implementation of the server and a client is just to allow people to play with the concept. It has many limitations, in particular it does not yet implement security, hashing and ARS pointer resources. We mainly used it to get an idea of the performance that could be achieved on a commodity PC (in particular the longest match lookup).

The server and client are Visual C++ projects, however they are written as portable C code. More information regarding this implementation is available in TIPHON-05 Temporary Document 49 (see Bibliography).

11.1.2.4 Server

The server (ars.exe) first loads a configuration file called "ars_records.txt" when started. This file is used as a permanent storage and could be a database in future versions. The file is then converted to the appropriate optimized memory format (now a binary tree) for the longest match requests. Future versions will use an even better format derived from routing table lookup algorithms.

When the server receives a request, it spawns a thread and does the necessary processing. The next version will use thread pooling for performance and memory management reasons.

The server periodically saves the memory records in the text file, and exits with CTRL-C. We will make an NT service version of the code for the next version (although it won't be portable, obviously).

11.1.2.5 Client

The client (resolver.exe) requires the IP address of the server as a parameter (no hashing repartition is yet implemented in this version). It then offers several options on the command line such as creating new records or sending requests. It also has a test mode for evaluating the performance of the server.

12 TIPHON-Net Tests with Pathchar

Pathchar is a special tool from Van Jacobson. It was developed in 1997. It helps to find path characteristics and it is similar to traceroute but designed to isolate congestion and loss problems rather than routing strangeness. It determines the bandwidth, propagation delay, queue & loss rate for each hop on an Internet path and the optimal TCP window size to match the performance of a path (especially important for inter continental links). It uses the same mechanism as traceroute (i.e. modulates the TTL (Time to live) and looks for ICMP (Internet Control Message Protocol) "time exceeded" messages) and works wherever traceroute works.

This tool is often used to determine bottlenecks.

12.1 Understanding Pathchar

Pathchar sends packets with different packet sizes from hop to hop and measures the response times. By default, pathchar is:

"doing 32 probes at each of 45 sizes (64 to 1500 by 32)" means:

that for all intermediate hops of the route each hop sends 32 packets of 64 bytes to the next hop, then again 32 packets of 64 + 32 = 96 bytes to this next hop, etc., up to 32 packets of 1500 bytes.

Thus it measures the bandwidth of each hop to hop connection and sends the bandwidth and some other information back to the source host. For calculating the bandwidth the program computes the gradient (response times / packet sizes) and smoothes these gradients with complex statistical mathematics. Problems are sometimes nonlinearities of the gradients, then the output is marked as "?? Mbit/s".

More details can be found in TIPHON-10 Temporary Document 40 (see Bibliography).

12.2 ETSI Gateway TIPHON 1

terminal output of Pathchar:

```
pathchar to 212.234.161.27 (212.234.161.27)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   270 us (3.32 ms)
 1 tiphon1.etsi.fr (212.234.161.27)
1 hops, rtt 541 us (3.32 ms), bottleneck 4.3 Mb/s, pipe 4500 bytes
```

12.3 ETSI Gateway TIPHON 2

terminal output of Pathchar:

```
pathchar to 212.234.161.32 (212.234.161.32)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   248 us (3.29 ms)
 1 tiphon2.etsi.fr (212.234.161.32)
1 hops, rtt 496 us (3.29 ms), bottleneck 4.3 Mb/s, pipe 4500 bytes
```

12.4 TIPHON Gateway 1 in Caen

terminal output of Pathchar:

```
pathchar to 194.199.139.242 (194.199.139.242)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   354 us (3.52 ms),  1% dropped
 1 etsi-bgp-router.etsi.fr (212.234.161.254)
 |    334 Kb/s,   5.05 ms (49.6 ms),  2% dropped
 2 Marseille3.rain.fr (212.234.242.29)
 |   8.0 Mb/s,   25 us (51.1 ms),  +q 3.17 ms (3.18 KB) *2
 3 Marseille2.rain.fr (194.250.4.50)
 |   1.7 Mb/s,   6.34 ms (71.0 ms),  +q 12.8 ms (2.67 KB) *2
 4 dar1.rain.fr (194.250.181.205)
 |    17 Mb/s,   -205 us (71.3 ms),  +q 9.22 ms (19.3 KB) *2
```

```
 5 rbs1.rain.fr (194.51.0.157)
 |    50 Mb/s,   63 us (71.6 ms),  +q 14.2 ms (89.1 KB) *2,  2% dropped
 6 Renater-gw.rain.fr (194.51.0.70)
                       -> 194.51.0.70 (1)
 |    18 Mb/s,   -12 us (72.3 ms),  +q 5.88 ms (13.2 KB) *2
 7?stamand1.renater.ft.net (195.220.180.89)
 |    14 Mb/s,   3.64 ms (80.4 ms),  +q 3.52 ms (6.03 KB) *2
 8 caen.renater.ft.net (195.220.180.130)
                       -> 195.220.180.130 (1)
 |    15 Mb/s,   201 us (81.7 ms),  +q 3.77 ms (6.86 KB) *2
 9?caen1.vikman.ft.net (192.70.113.10)
                       -> 192.70.113.10 (1)
 |    58 Mb/s,   428 us (82.7 ms),  +q 3.67 ms (26.5 KB) *2
10?sept-caen.vikman.ft.net (192.70.113.130)
                       -> 192.70.113.130 (1)
 |   9.1 Mb/s,   -307 us (83.4 ms),  +q 2.98 ms (3.39 KB) *2
11?192.33.161.1 (192.33.161.1)
12  *
 |   4.2 Mb/s,   2.60 ms (91.5 ms),  +q 40.6 ms (21.2 KB) *6, 2% dropped
13 194.199.139.242 (194.199.139.242)
13 hops, rtt 36.3 ms (91.5 ms), bottleneck  334 Kb/s, pipe 6908 bytes
```

12.5 TIPHON Gateway 2 in Caen

terminal output of Pathchar:

```
pathchar to 194.199.139.248 (194.199.139.248)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   343 us (3.49 ms),  1% dropped
 1 etsi-bgp-router.etsi.fr (212.234.161.254)
 |    333 Kb/s,   5.00 ms (49.6 ms),  3% dropped
 2 Marseille3.rain.fr (212.234.242.29)
 |    10 Mb/s,   100 us (51.0 ms),  +q 3.33 ms (4.21 KB) *2
 3 Marseille2.rain.fr (194.250.4.50)
 |   1.6 Mb/s,   6.16 ms (70.9 ms),  +q 12.4 ms (2.45 KB) *2
 4 dar1.rain.fr (194.250.181.205)
 |   14 Mb/s,   238 us (71.5 ms),  +q 9.95 ms (142 KB) *2
 5 rbs1.rain.fr (194.51.0.157)
 |   17 Mb/s,   -276 us (71.6 ms),  +q 16.2 ms (33.8 KB) *2,  1% dropped
 6 Renater-gw.rain.fr (194.51.0.70)
                       -> 194.51.0.70 (1)
 |   ?? b/s,   373 us (71.6 ms)
 7?stamand1.renater.ft.net (195.220.180.89)
 |   9.8 Mb/s,   3.62 ms (80.1 ms),  +q 3.51 ms (4.30 KB) *2
 8 caen.renater.ft.net (195.220.180.130)
                       -> 195.220.180.130 (1)
 |   9.2 Mb/s,   69 us (81.5 ms),  +q 3.62 ms (4.17 KB) *2
 9?caen1.vikman.ft.net (192.70.113.10)
 |   58 Mb/s,   457 us (82.5 ms),  +q 3.69 ms (2.8 MB) *2
10 sept-caen.vikman.ft.net (192.70.113.130)
 |   11 Mb/s,   -304 us (83.0 ms),  +q 3.29 ms (4.40 KB) *2
11 192.33.161.1 (192.33.161.1)
12  *
 |   2.4 Mb/s,   1.54 ms (91.1 ms),  +q 13.7 ms (4.10 KB) *2
13 194.199.139.248 (194.199.139.248)
13 hops, rtt 34.7 ms (91.1 ms), bottleneck  333 Kb/s, pipe 7130 bytes
```

12.6 PTA TIPHON Gateway Vienna

terminal output of Pathchar:

```
pathchar to 195.3.82.115 (195.3.82.115)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   350 us (3.51 ms),  1% dropped
 1 etsi-bgp-router.etsi.fr (212.234.161.254)
 |    504 Kb/s,   4.32 ms (36.0 ms)
 2 marseille1.esplanade3000.net (195.115.3.129)
 |    957 Kb/s,   6.32 ms (61.2 ms)
 3 nnc2.esplanade3000.net (195.115.0.133)
 |    35 Mb/s,   7 us (61.5 ms)
 4 nnc1.esplanade3000.net (195.115.0.40)
 |    46 Mb/s,   48.7 ms (159 ms)
 5 New-York.esplanade3000.net (195.115.0.86)
 |    29 Mb/s,   458 us (160 ms),  +q 1.07 ms (3.91 KB) *14
 6 gin-nyy-bb5.TELEGLOBE.net (207.45.201.129)
 |   114 Mb/s,   4.55 ms (170 ms),  +q 1.23 ms (17.7 KB) *13
 7 gin-mtt-bb2.TELEGLOBE.net (207.45.223.61)
 |    49 Mb/s,   7.74 ms (185 ms),  +q 17.2 ms (11 MB) *2,  3% dropped
```

```
 8 gin-ppt-bb2.TELEGLOBE.net (207.45.223.41)
 |    20 Mb/s,   45.6 ms (277 ms),  +q 2.34 ms (5.93 KB) *5
 9 PTAustia-gw.TELEGLOBE.net (207.45.206.162)
10  *
 |   1.6 Mb/s,   1.21 ms (287 ms),  +q 12.2 ms (2.45 KB) *3
11 172.16.94.110 (172.16.94.110)
 |    11 Mb/s,   -469 us (287 ms),  +q 15.5 ms (21.7 KB) *2,  2% dropped
12 gw1.imm.aon.at (195.3.82.115)
12 hops, rtt 237 ms (287 ms), bottleneck  504 Kb/s, pipe 18065 bytes
```

12.7 Deutsche Telekom Berkom TIPHON Gateway Berlin

terminal output of Pathchar:

```
pathchar to 141.39.12.150 (141.39.12.150)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   353 us (3.51 ms),  1% dropped
 1 etsi-bgp-router.etsi.fr (212.234.161.254)
 |   333 Kb/s,   5.08 ms (49.7 ms)
 2 Marseille3.rain.fr (212.234.242.29)
 |    10 Mb/s,   61 us (51.0 ms),  +q 6.51 ms (8.52 KB) *4
 3 Marseille.rain.fr (194.250.4.49)
                       -> 194.250.181.205 (4039)
 |   1.8 Mb/s,   6.60 ms (70.7 ms),  +q 11.5 ms (2.64 KB) *2,  2% dropped
 4?DAR2-s-4-1-3.rain.fr (194.250.2.5)
 |    24 Mb/s,   44 us (71.3 ms),  +q 10.0 ms (29.6 KB) *2
 5 rbs1.rain.fr (194.51.0.157)
                       -> 204.59.3.17 (749)
                       -> 194.51.0.157 (93)
                       -> 204.59.3.21 (790)
 |   1.9 Mb/s,   9.53 ms (96.7 ms),  +q 71.9 ms (17.3 KB) *2
 6?gip-telehouse-1-serial5-1.GIP.net (204.59.3.13)
                       -> 204.59.3.13 (1)
                       -> 204.59.3.17 (1)
 |   5.6 Mb/s,   -1868 us (95.1 ms),  +q 70.7 ms (49.7 KB) *2,  1% dropped
 7?gip-telehouse-2-fastethernet0-1.GIP.net (204.59.2.196)
 |   6.7 Mb/s,   -1866 us (93.1 ms),  +q 22.5 ms (19.0 KB)
 8 london2.att-unisource.net (195.206.66.217)
                       -> 195.206.66.217 (1)
 |   9.0 Mb/s,   -353 us (93.7 ms),  +q 13.0 ms (14.7 KB) *2
 9?london5.att-unisource.net (195.206.64.29)
 |    34 Mb/s,   2.60 ms (99.3 ms),  +q 2.48 ms (10.6 KB) *2
10 amsterdam9.att-unisource.net (195.206.65.29)
 |    55 Mb/s,   -169 us (99.2 ms),  +q 2.42 ms (16.6 KB) *2
11 amsterdam5.att-unisource.net (195.206.65.89)
 |    46 Mb/s,   5.63 ms (111 ms),  +q 2.36 ms (13.7 KB) *2
12 frankfurt5.att-unisource.net (195.206.67.146)
 |    24 Mb/s,   305 us (112 ms),  +q 2.68 ms (8.15 KB) *2
13 frankfurt6.att-unisource.net (195.206.64.42)
 |   ?? b/s,   1.17 ms (113 ms)
14 DE.ten-34.net (195.206.64.62)
                       -> 195.206.64.62 (1)
 |    49 Mb/s,   -38 us (114 ms),  +q 8.86 ms (54.6 KB) *2
15?ir-frankfurt1.WiN-IP.DFN.de (193.203.227.18)
 |   22 Mb/s,   71 us (114 ms),  +q 7.80 ms (2.2 MB) *2
16 ZR-Frankfurt1.WiN-IP.DFN.de (188.1.144.98)
                       -> 188.1.144.98 (1)
 |    14 Mb/s,   4.09 ms (123 ms),  +q 7.85 ms (13.7 KB) *2
17?ZR-Berlin1.WiN-IP.DFN.de (188.1.144.105)
                       -> 188.1.144.105 (1)
 |    50 Mb/s,   -498 us (122 ms),  +q 7.12 ms (44.2 KB) *2
18?FU-Berlin1.WiN-IP.DFN.de (188.1.162.10)
                       -> 188.1.162.10 (1)
 |   3.3 Mb/s,   33 us (126 ms),  +q 5.74 ms (2.35 KB) *2
19?KR-DeTeBerkom.WiN-IP.DFN.de (188.1.1.106)
 |   9.2 Mb/s,   693 us (128 ms),  +q 3.46 ms (3.97 KB) *2
20 orion.berkom.de (141.39.12.150)
20 hops, rtt 63.0 ms (128 ms), bottleneck  333 Kb/s, pipe 8261 bytes
```

12.8 Jeff Pulver TIPHON Gateway New York

terminal output of Pathchar:

```
pathchar to 204.7.54.41 (204.7.54.41)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   356 us (3.51 ms)
 1 etsi-bgp-router.etsi.fr (212.234.161.254)
 |    506 Kb/s,   4.33 ms (35.9 ms)
```

```
 2 marseille1.esplanade3000.net (195.115.3.129)
 |    955 Kb/s,   6.30 ms (61.1 ms)
 3 nnc2.esplanade3000.net (195.115.0.133)
 |    33 Mb/s,   68 us (61.6 ms)
 4 nnc1.esplanade3000.net (195.115.0.40)
 |    29 Mb/s,   48.6 ms (159 ms),  +q 10.1 ms (36.5 KB) *4,  2% dropped
 5 New-York.esplanade3000.net (195.115.0.86)
 |   205 Mb/s,   2.53 ms (164 ms),  +q 1.07 ms (27.5 KB) *7
 6 gin-nyy-bb5.TELEGLOBE.net (207.45.201.129)
 |    28 Mb/s,   -187 us (164 ms)
 7 gin-nyy-ac1.TELEGLOBE.net (207.45.223.74)
 |    16 Mb/s,   691 us (167 ms),  +q 1.91 ms (3.93 KB) *17
 8 204.6.117.121 (204.6.117.121)
 |    18 Mb/s,   1.55 ms (170 ms),  +q 3.25 ms (7.39 KB) *6
 9 ne.sc.PSI.net (38.1.3.1)
 |   3.4 Mb/s,   2.20 ms (178 ms),  +q 4.27 ms (1.82 KB) *2
10 rc8.northeast.us.PSI.net (38.1.21.8)
 |    373 Kb/s,   3.03 ms (217 ms)
11 38.2.218.48 (38.2.218.48)
 |    52 Mb/s,   2.17 ms (221 ms),  +q 11.6 ms (75.1 KB) *4
12 gateway1.PULVER.com (204.7.54.41)
12 hops, rtt 143 ms (221 ms), bottleneck  373 Kb/s, pipe 10858 bytes
```

12.9 Mediatrix TIPHON Gateway Canada

Terminal output of Pathchar:

```
pathchar to 205.237.248.128 (205.237.248.128)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   360 us (3.52 ms),  12% dropped
 1 195.101.208.62 (195.101.208.62)
 |    201 Kb/s,   5.47 ms (74.4 ms),  11% dropped
 2 212.234.242.29 (212.234.242.29)
                        -> 194.250.4.49 (471)
 |   9.4 Mb/s,   61 us (75.8 ms),  +q 2.39 ms (2.81 KB) *2,  15% dropped
 3?Marseille2.rain.fr (194.250.4.50)
                        -> 194.250.2.5 (1812)
 |   1.6 Mb/s,   7.34 ms (97.9 ms),  +q 12.3 ms (2.47 KB) *3,  25% dropped
 4?dar1.rain.fr (194.250.181.205)
 |   ?? b/s,   207 us (97.5 ms),  12% dropped
 5 rbs1.rain.fr (194.51.0.157)
 |   ?? b/s,   44.0 ms (185 ms),  12% dropped
 6 194.51.2.162 (194.51.2.162)
                        -> 194.51.2.162 (100)
 |    28 Mb/s,   2 us (186 ms),  +q 3.14 ms (11.1 KB) *5,  15% dropped
 7?bagnolet2-atm-3.opentransit.NET (193.55.152.26)
                        -> 193.55.152.26 (73)
 |   6.4 Mb/s,   -282 us (187 ms),  +q 4.71 ms (3.77 KB) *2,  3% dropped
 8?relay-pos-6.opentransit.NET (193.55.152.70)
                        -> 193.55.152.70 (133)
 |   ?? b/s,   0.97 ms (188 ms),  7% dropped
 9?sl-bb11-rly-8-3.sprintlink.NET (144.232.8.209)
                        -> 144.232.8.209 (17)
 |    40 Mb/s,   49.0 ms (286 ms),  +q 7.03 ms (34.9 KB) *5,  13% dropped
10?sl-bb10-pen-7-0.sprintlink.NET (144.232.8.154)
                        -> 144.232.8.154 (12)
 |    16 Mb/s,   -10558 us (266 ms),  +q 12.7 ms (25.2 KB),  13% dropped
11?sl-gw11-pen-8-0-0.sprintlink.NET (144.232.5.82)
                        -> 144.232.5.82 (9)
 |    44 Mb/s,   -32973 us (200 ms),  +q 2.84 ms (15.6 KB),  12% dropped
12?sl-vmtl-1--T3.SPRINTLINK.NET (144.228.164.18)
                        -> 144.228.164.18 (7)
 |    33 Mb/s,   91 us (201 ms),  +q 2.94 ms (12.0 KB) *2,  13% dropped
13?100mbit-fe-5-0.rb01-piex.VIDEOTRON.NET (207.253.253.34)
                        -> 207.253.253.34 (16)
 |    60 Mb/s,   3 us (201 ms),  +q 5.01 ms (37.6 KB) *7,  12% dropped
14?100mbit-fe-5-0.rb02-piex.VIDEOTRON.NET (207.253.253.50)
                        -> 207.253.215.14 (878)
                        -> 207.253.253.50 (18)
                        -> 207.253.253.34 (1)
                        -> 207.253.160.66 (617)
                        -> 205.237.248.65 (38)
 |   1.5 Mb/s,   3.63 ms (216 ms),  +q 41.3 ms (7.93 KB) *2,  32% dropped
15?s0.abads1001.rb02-piex.VIDEOTRON.NET (207.253.215.10)
                        -> 207.253.215.14 (6)
                        -> 207.253.215.10 (4)
 |   6.9 Mb/s,   380 us (219 ms),  +q 21.0 ms (18.0 KB) *3,  11% dropped
16?office1.ABACOM.COM (207.253.160.66)
                        -> 207.253.160.66 (14)
                        -> 205.237.248.128 (49)
                        -> 194.250.4.50 (6)
```

```
 |    146 Kb/s,   17.7 ms (336 ms),  12% dropped
17?isdn128k.MEDIATRIX.COM (205.237.248.65)
                        -> 205.237.248.65 (10)
 |   ?? b/s,   1.66 ms (340 ms),  15% dropped
18?205.237.248.128 (205.237.248.128)
18 hops, rtt 174 ms (340 ms), bottleneck  146 Kb/s, pipe 9156 bytes
```

12.10 TransNexus TIPHON Gateway Atlanta

terminal output of Pathchar:

```
pathchar to 208.224.203.242 (208.224.203.242)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   345 us (3.49 ms),  9% dropped
 1 195.101.208.62 (195.101.208.62)
 |    504 Kb/s,   4.04 ms (35.4 ms),  13% dropped
 2 marseille1.ESPLANADE3000.NET (195.115.3.129)
 |    955 Kb/s,   7.79 ms (63.5 ms),  12% dropped
 3 nnc2.ESPLANADE3000.NET (195.115.0.133)
 |    28 Mb/s,   59 us (64.1 ms),  11% dropped
 4 nnc1.ESPLANADE3000.NET (195.115.0.10)
 |    67 Mb/s,   49.7 ms (164 ms),  11% dropped
 5 ri-renater.gix-paris.ft.NET (194.68.129.34)
                        -> 194.51.2.162 (12)
 |    27 Mb/s,   441 us (165 ms),  12% dropped
 6?Teleglobe.NET (207.45.201.129)
 |   188 Mb/s,   -43 us (165 ms),  +q 1.02 ms (24.0 KB) *2,  13% dropped
 7 gin-nyy-bb1.Teleglobe.NET (207.45.223.66)
                        -> 157.130.4.165 (1326)
                        -> 137.39.31.101 (13)
 |    40 Mb/s,   270 us (166 ms),  26% dropped
 8?Serial1-0-1.GW2.NYC2.ALTER.NET (157.130.5.217)
 9  *
10  *
                        -> 146.188.136.61 (36)
 |   ?? b/s,   413 us (167 ms),  14% dropped
11?294.ATM2-0.TR2.NYC1.ALTER.NET (146.188.178.202)
 |    40 Mb/s,   8.75 ms (184 ms),  +q 1.47 ms (7.27 KB),  13% dropped
12 104.ATM7-0.TR2.ATL1.ALTER.NET (146.188.136.61)
 |   ?? b/s,   68 us (184 ms),  13% dropped
13 298.ATM7-0.XR2.ATL1.ALTER.NET (146.188.232.109)
 |   ?? b/s,   240 us (185 ms),  17% dropped
14 194.ATM5-0-0.GW1.ATL1.ALTER.NET (146.188.232.37)
 |   1.4 Mb/s,   2.07 ms (198 ms),  10% dropped
15 sophia1.r3t2.ft.NET (193.48.50.61)
                        -> 146.188.232.41 (39)
 |   3.4 Mb/s,   -636 us (200 ms),  +q 12.8 ms (5.48 KB) *3,  14% dropped
16?vocaltec.TRANSNEXUS.COM (208.224.203.242)
16 hops, rtt 147 ms (200 ms), bottleneck  504 Kb/s, pipe 12610 bytes
```

12.11 TIPHON Gateway INTELSAT Washington

terminal output of Pathchar:

```
pathchar to 208.202.21.56 (208.202.21.56)
 doing 32 probes at each of 45 sizes (64 to 1500 by 32)
 0 localhost
 |   4.3 Mb/s,   323 us (3.44 ms)
 1 etsi-bgp-router.etsi.fr (212.234.161.254)
 |    504 Kb/s,   4.25 ms (35.8 ms)
 2 marseille1.esplanade3000.net (195.115.3.129)
 |    954 Kb/s,   6.18 ms (60.7 ms)
 3 nnc2.esplanade3000.net (195.115.0.133)
 |    56 Mb/s,   97 us (61.1 ms)
 4 nnc1.esplanade3000.net (195.115.0.10)
 |    34 Mb/s,   50.7 ms (163 ms)
 5 New-York.esplanade3000.net (195.115.0.86)
 |    37 Mb/s,   425 us (164 ms)
 6 gin-nyy-bb5.TELEGLOBE.net (207.45.201.129)
 |    67 Mb/s,   -113 us (164 ms)
 7 gin-nyy-bb1.TELEGLOBE.net (207.45.223.66)
 |    67 Mb/s,   419 us (165 ms),  +q 1.16 ms (9.67 KB) *3
 8 Serial1-0-1.GW2.NYC2.ALTER.net (157.130.5.217)
 |   201 Mb/s,   167 us (165 ms),  +q 1.11 ms (28.0 KB) *2
 9 322.ATM1-0-0.CR1.NYC2.ALTER.net (137.39.31.97)
 |    70 Mb/s,   -139 us (165 ms)
10 141.ATM3-0.XR2.NYC1.ALTER.net (146.188.177.30)
 |   124 Mb/s,   201 us (166 ms),  +q 1.14 ms (17.7 KB) *2
11 146.188.178.230 (146.188.178.230)
```

```
 |   1067 Mb/s,   2.00 ms (170 ms)
12 105.ATM6-0.TR2.DCA1.ALTER.net (146.188.136.189)
 |   ?? b/s,   329 us (170 ms)
13 198.ATM4-0-0.XR2.TCO1.ALTER.net (146.188.161.177)
 |    73 Mb/s,   231 us (171 ms)
14 192.ATM11-0-0.GW2.TCO1.ALTER.net (146.188.160.61)
 |   1.4 Mb/s,   1.61 ms (183 ms)
15 208.202.21.18 (208.202.21.18)
 |   4.6 Mb/s,   -631 us (184 ms)
16 208.202.21.19 (208.202.21.19)
 |    13 Mb/s,   333 us (185 ms),  +q 1.14 ms (1.88 KB) *2
17 192.168.32.33 (192.168.32.33)
 |   10.0 Mb/s,   17 us (187 ms)
18 208.202.21.56 (208.202.21.56)
18 hops, rtt 133 ms (187 ms), bottleneck  504 Kb/s, pipe 11758 bytes
```

13 Tests with VisualRoute

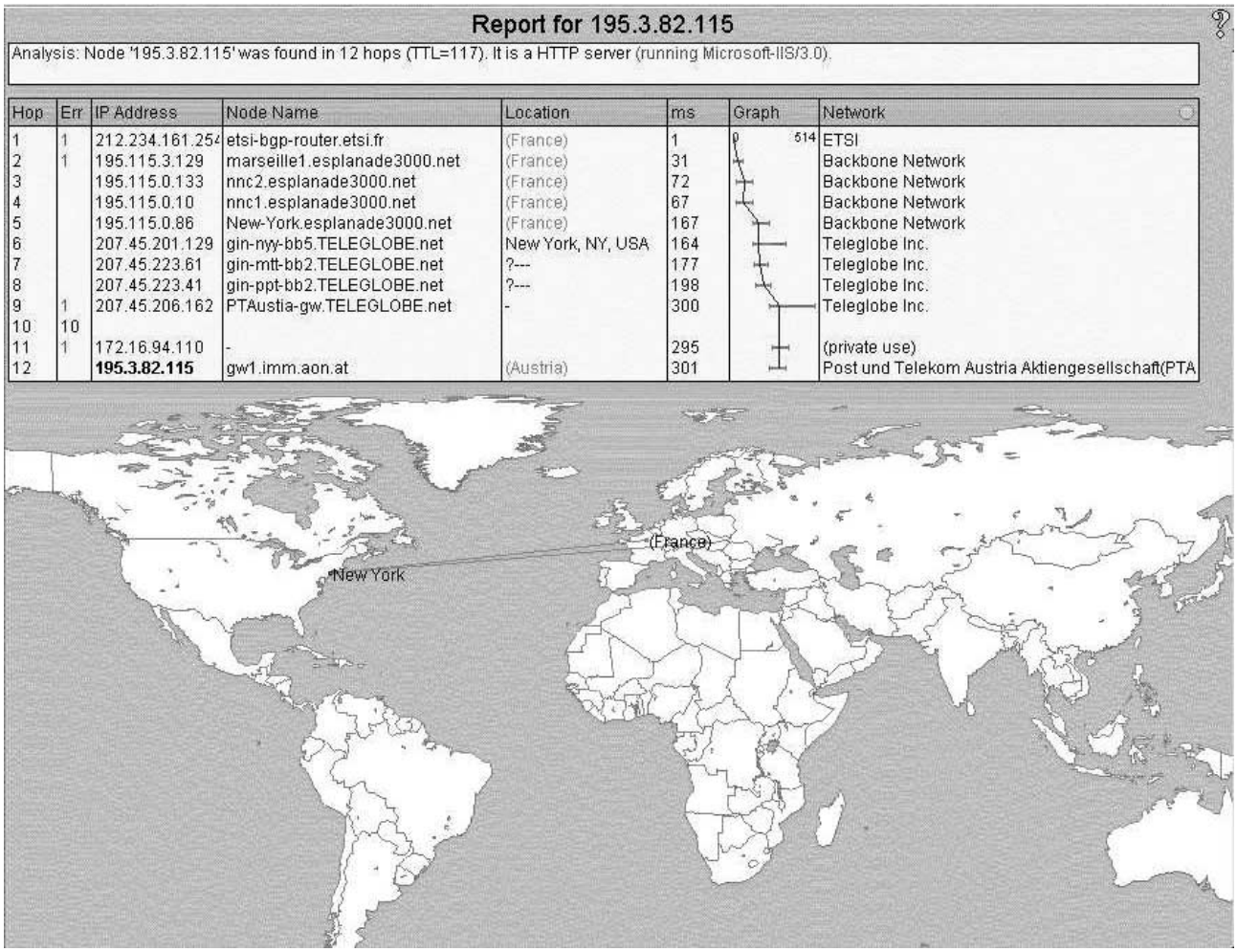
The tests with VisualRoute should help to get an overview about the different geographical routes between the TIPHON gateways. VisualRoute fetches DNS LOC records (as specified in RFC 1876 [1]) for geographical location information.

Description of the output:

Hop	The trace route hop count.
Err	The number of ping packets that were lost at this hop level. This number is red if a host is detected at this hop level. This means that ping packets are being lost. Otherwise, this number is black, because the host may just be ignoring all of our ping packets.
IP Address	The IP address of the host at this hop level. It is red if a recent ping packet was lost. It is blue when it matches a Loose Source Route IP address. Otherwise, it is black. The IP Address is bolded if it is the host that you are trace routing to.
Node Name	The DNS lookup of the IP Address.
Location	The location of the node. It is black if we are fairly certain of the node's location. Otherwise it is purple, meaning that the location is a best guess based upon information from various WHOIS databases.
ms	The average number of milliseconds that it took for a ping packet to go from your machine to this hop level and back to your machine (just like the system 'tracert' program).
Graph	The blue line is a graph of the 'ms' column. The gray horizontal bar in each hop line represents the minimum and maximum millisecond times for that hop level.
Network	The network that this node is in, as reported by various WHOIS databases.

13.1 Output of the route from ETSI to the PTA TIPHON Gateway in Vienna, Austria

It is very interested that the route from ETSI to the PTA TIPHON Gateway Vienna is over New York. ETSI has a very fast connection to New York and also the PTA has one. Thus the voice packets travel a long way round to the destination.

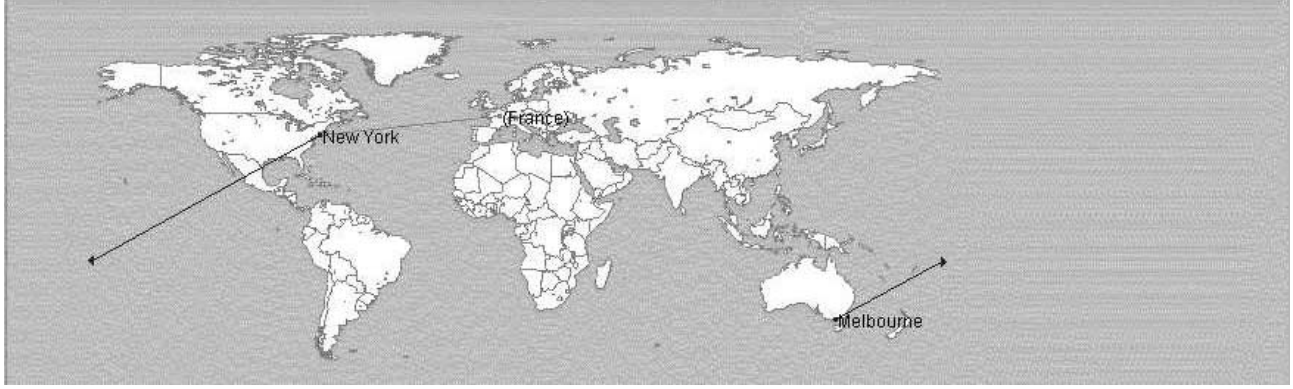


13.2 Output of the route from ETSI to the Adacel TIPHON Gateway in Melbourne, Australia

Report for 203.36.26.148

Analysis: The network connection to '203.36.26.148' is up (203.36.26.143 responds), but host '203.36.26.148' does not respond. Connections to HTTP port 80 are being rejected. Node 192.168.60.2 at hop 17 in network "(private use)" reports "The destination network is unreachable".

Hop	Err	IP Address	Node Name	Location	ms	Graph	Network
1		212.234.161.254	etsi-bgp-router.etsi.fr	(France)	1	0 1475	ETSI
2		195.115.3.129	marseille1.esplanade3000.net	(France)	13		Backbone Network
3		195.115.0.133	nnc2.esplanade3000.net	(France)	25		Backbone Network
4		195.115.0.40	nnc1.esplanade3000.net	(France)	26		Backbone Network
5		195.115.0.86	New-York.esplanade3000.net	(France)	124		Backbone Network
6		207.45.201.129	gin-nyy-bb5.TELEGLOBE.net	New York, NY, USA	151		Teleglobe Inc.
7		207.45.223.66	gin-nyy-bb1.TELEGLOBE.net	New York, NY, USA	130		Teleglobe Inc.
8		204.70.219.121	borderx2-hssi3-0.NewYork.CW.net	Vienna, VA 22182	135		MCI IP Development
9	2	204.70.219.65	core2-fddi-1.NewYork.CW.net	Vienna, VA 22182	143		MCI IP Development
10		204.70.1.246	core4-hssi-5.Washington.CW.net	Vienna, VA 22182	148		MCI IP Development
11		204.70.4.65	core2.Bloomington.CW.net	Vienna, VA 22182	295		MCI IP Development
12		204.70.208.68	borderx2-fddi-1.Bloomington.CW.ne	Vienna, VA 22182	310		MCI IP Development
13		204.70.208.118	telstra-internet.Bloomington.CW.net	Vienna, VA 22182	445		MCI IP Development
14	1	139.130.239.226	Fddi0-0.Ion7.Melbourne.TELSTRA.n	Melbourne, Australia	395		Australian Academic and Research Network
15		139.130.126.2	acci.Ink.TELSTRA.net	-	397		Australian Academic and Research Network
16		203.25.254.2	-		440		The Australian Internet Registry Pty Ltd
17	10	192.168.60.2	-		434		(private use)

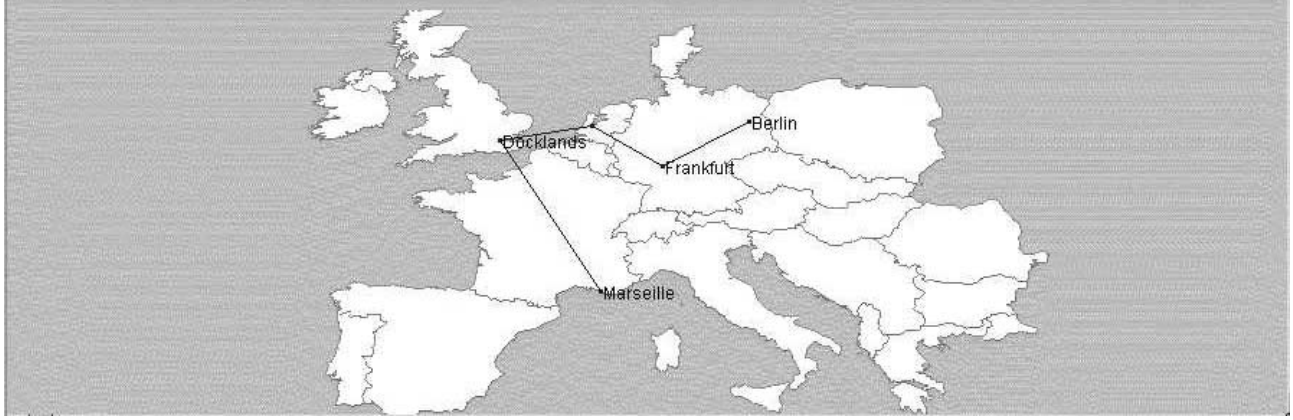


13.3 Output of the route from ETSI to the Deutsche Telekom Berkom TIPHON Gateway in Berlin, Germany

Report for 141.39.12.150

Analysis: Node '141.39.12.150' was found in 20 hops (TTL=115). But, problems starting at hop 4 in network "TRANSPAC France" are causing IP packets to be dropped. Connections to HTTP port 80 are being rejected.

Hop	Err	IP Address	Node Name	Location	ms	Graph	Network
1		212.234.161.254	etsi-bgp-router.etsi.fr	(France)	1	0 1681	ETSI
2		212.234.242.29	Marseille3.rain.fr	Marseille, France	885		TRANSPAC France
3		194.250.4.50	Marseille2.rain.fr	Marseille, France	892		RAIN, Transpac, France
4	1	194.250.181.205	dar1.rain.fr	-	917		TRANSPAC France
5	1	194.51.0.157	rbs1.rain.fr	-	960		RAIN, Transpac, France
6		204.59.3.21	gip-telehouse-1-serial6-3.GIP.net	Docklands, UK	1134		Sprint International
7	3	204.59.2.196	gip-telehouse-2-fastethernet0-1.GIP	Docklands, UK	1578		Sprint International
8		195.206.66.217	london2.att-unisource.net	London, UK	1108		European Backbone
9		195.206.64.201	london5.att-unisource.net	London, UK	1121		European Backbone
10	1	195.206.65.29	amsterdam9.att-unisource.net	Amsterdam, Netherla	1137		European Backbone
11	1	195.206.65.89	amsterdam5.att-unisource.net	Amsterdam, Netherla	1116		European Backbone
12		195.206.67.146	frankfurt5.att-unisource.net	Frankfurt, Germany	1191		European Backbone
13	1	195.206.64.42	frankfurt6.att-unisource.net	Frankfurt, Germany	1198		European Backbone
14		195.206.64.62	DE.ten-34.net	(Netherlands)	1143		European Backbone
15		193.203.227.18	ir-frankfurt1.WiN-IP.DFN.de	Frankfurt, Germany	1186		TEN-34 Backbone
16		188.1.144.98	ZR-Frankfurt1.WiN-IP.DFN.de	Frankfurt, Germany	1146		DFN-Verein
17	1	188.1.144.105	ZR-Berlin1.WiN-IP.DFN.de	Berlin, Germany	1145		DFN-Verein
18		188.1.162.10	FU-Berlin1.WiN-IP.DFN.de	Berlin, Germany	1184		DFN-Verein
19	2	188.1.1.106	KR-DeTeBerkom.WiN-IP.DFN.de	-	1192		DFN-Verein
20	3	**141.39.12.150**	orion.berkom.de	Berlin, Germany	1161		Detecon TZ Berlin

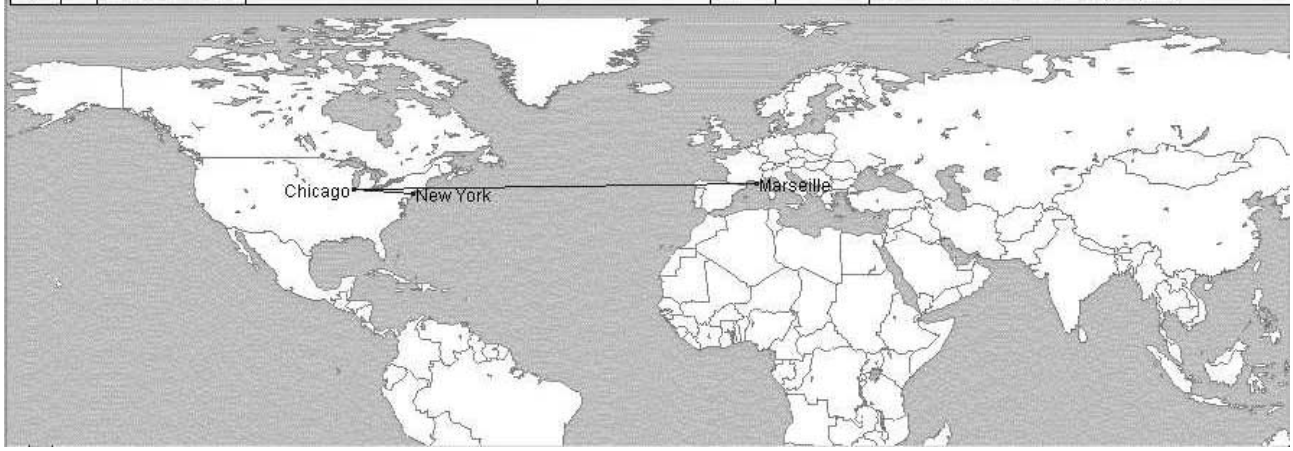


13.4 Output of the route from ETSI to the Mediatrix TIPHON Gateway in Sherebrook, Canada

Report for 205.237.248.128

Analysis: Node '205.237.248.128' was found in 19 hops (TTL=114). Connections to HTTP port 80 are being rejected.

Hop	Err	IP Address	Node Name	Location	ms	Graph	Network
1		212.234.161.254	etsi-bgp-router.etsi.fr	(France)	1	0 427	ETSI
2		212.234.242.29	Marseille3.rain.fr	Marseille, France	47		TRANSPAC France
3		194.250.4.50	Marseille2.rain.fr	Marseille, France	56		RAIN, Transpac, France
4		194.250.181.205	dar1.rain.fr	-	75		TRANSPAC France
5		194.51.0.157	rbs1.rain.fr	-	78		RAIN, Transpac, France
6		194.51.2.162	-		75		RAIN, Transpac, France
7	3	193.55.152.78	chicago-atm-5.opentransit.net	Paris, France	150		France Telecom
8		194.206.207.42	chicago-hssi-0-sprint.opentransit.ne	Paris, France	177		France Telecom
9		144.232.0.141	sl-bb12-chi-1-1.SPRINTLINK.net	Chicago, IL, USA	190		Sprint/United Information Service
10		144.232.10.5	sl-bb11-chi-8-0.SPRINTLINK.net	Chicago, IL, USA	169		Sprint/United Information Service
11		144.232.8.201	sl-bb10-nyc-0-0-0.SPRINTLINK.net	New York, NY, USA	199		Sprint/United Information Service
12		144.232.7.46	sl-gw4-nyc-0-0-0.SPRINTLINK.net	New York, NY, USA	169		Sprint/United Information Service
13		144.232.171.14	sl-vmtl-2-0-T3.SPRINTLINK.net	-	170		Sprint/United Information Service
14		207.253.253.52	100mbit-fe-5-1-0.bb01-piex.VIDEOTI	Montreal, Canada	163		Videotron Telecom Ltee.
15		207.253.253.46	DS3-h-1-0.rb01-chlt.VIDEOTRON.ne	Montreal, Canada	158		Videotron Telecom Ltee.
16		207.253.236.18	abacom-10mbps.ABACOM.com	(Canada)	158		Le Groupe Videotron, Services PC
17		207.253.160.67	office2.ABACOM.com	(Canada)	177		Les Services Internet ABACOM inc.
18		205.237.248.65	isdn128k.MEDIATRIX.com	(Canada)	206		FMMO Publications Informatiques, Inc.
19		**205.237.248.128**	-		205		FMMO Publications Informatiques, Inc.

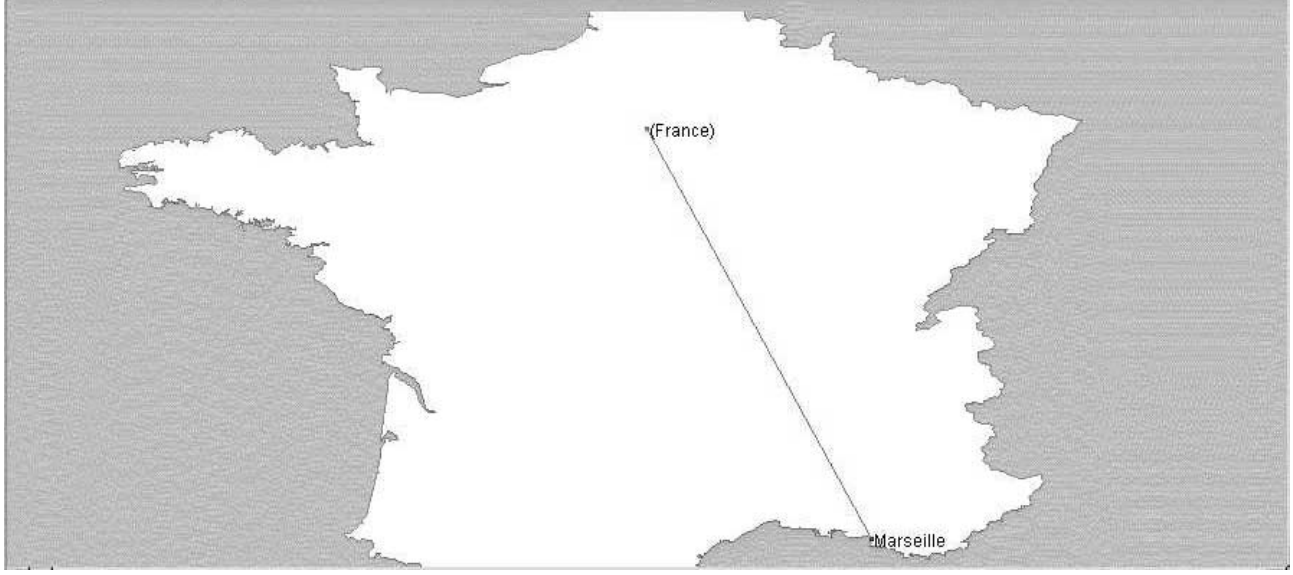


13.5 Output of the route from ETSI to the France Telecom TIPHON Gateway in Caen, France

Report for 194.199.139.242

Analysis: Node '194.199.139.242' was found in 13 hops (TTL=52). Connections to HTTP port 80 are being rejected.

Hop	Err	IP Address	Node Name	Location	ms	Graph	Network
1		212.234.161.254	etsi-bgp-router.etsi.fr	(France)	1	0 521	ETSI
2		212.234.242.29	Marseille3.rain.fr	Marseille, France	24		TRANSPAC France
3		194.250.4.50	Marseille2.rain.fr	Marseille, France	27		RAIN, Transpac, France
4		194.250.181.205	dar1.rain.fr	-	85		TRANSPAC France
5		194.51.0.157	rbs1.rain.fr	-	77		RAIN, Transpac, France
6		194.51.0.70	Renater-gw.rain.fr	-	68		RAIN, Transpac, France
7		195.220.180.89	stamand1.renater.ft.net	Paris, France	116		FT-CSCRE Paris St Amand
8		195.220.180.130	caen.renater.ft.net	Paris, France	69		FT-CSCRE Paris St Amand
9		192.70.113.10	caen1.vikman.ft.net	(France)	64		FNET
10	1	192.70.113.130	sept-caen.vikman.ft.net	(France)	127		FNET
11		192.33.161.1	-		94		Service d'Etudes Communes des Postes et Telecom
12	10						
13		**194.199.139.242**	-		92		SEPT CAEN

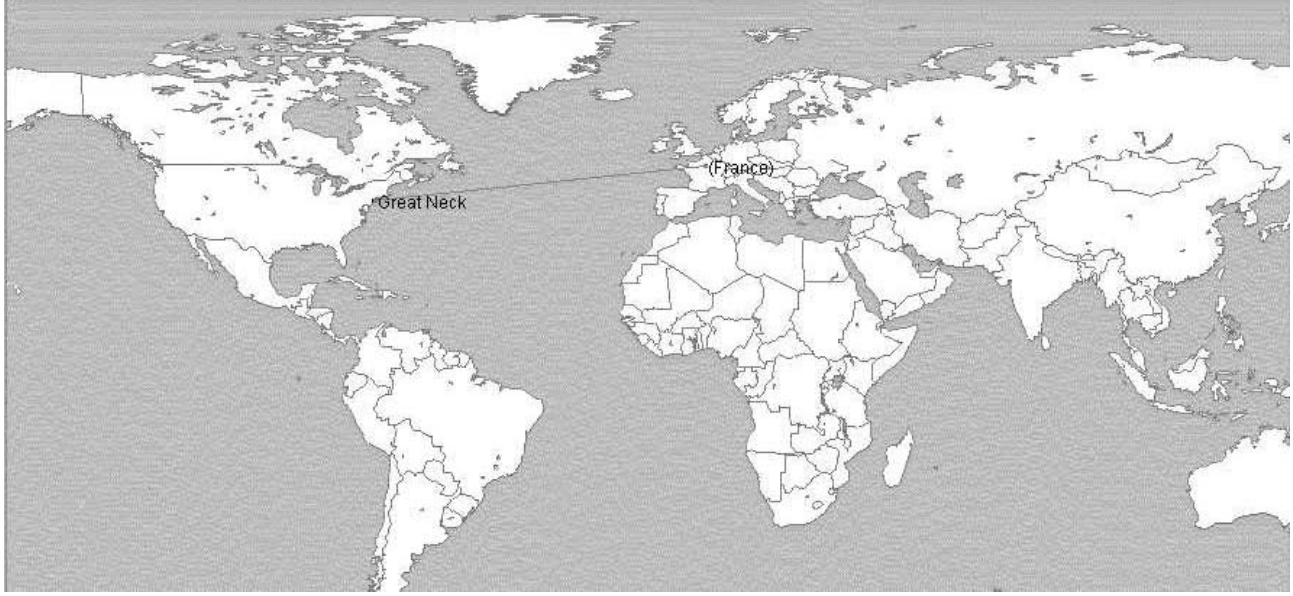


13.6 Output of the route from ETSI to the Jeff Pulver TIPHON Gateway in New York, USA

Report for 204.7.54.41

Analysis: Node '204.7.54.41' was found in 12 hops (TTL=117). It is a HTTP server (running Netscape-FastTrack/3.01).

Hop	Err	IP Address	Node Name	Location	ms	Graph	Network
1		212.234.161.254	etsi-bgp-router.etsi.fr	(France)	1	0 528	ETSI
2		195.115.3.129	marseille1.esplanade3000.net	(France)	87		Backbone Network
3		195.115.0.133	nnc2.esplanade3000.net	(France)	85		Backbone Network
4		195.115.0.10	nnc1.esplanade3000.net	(France)	157		Backbone Network
5		195.115.0.86	New-York.esplanade3000.net	(France)	200		Backbone Network
6		207.45.201.129	gin-nyy-bb5.TELEGLOBE.net	New York, NY, USA	204		Teleglobe Inc.
7		207.45.223.74	gin-nyy-ac1.TELEGLOBE.net	New York, NY, USA	245		Teleglobe Inc.
8		204.6.117.121	-		241		Performance Systems International, Inc.
9		38.1.3.1	ne.sc.PSI.net	-	256		Performance Systems International
10		38.1.21.8	rc8.northeast.us.PSI.net	-	223		Performance Systems International
11		38.2.218.48	-		323		Performance Systems International
12		**204.7.54.41**	gateway1.PULVER.com	Great Neck, NY 1102	386		Performance Systems International, Inc.

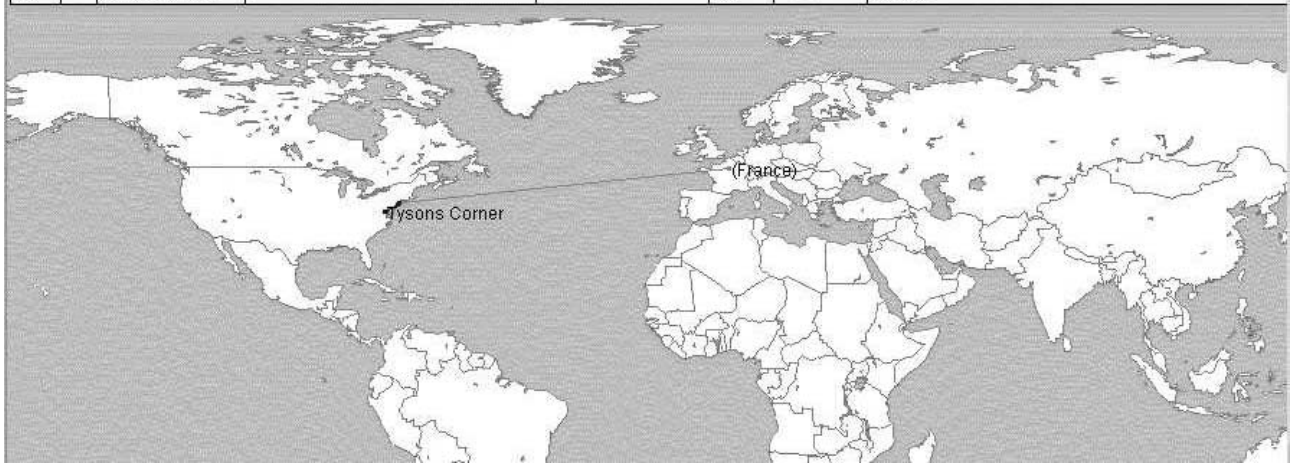


13.7 Output of the route from ETSI to the INTELSAT TIPHON Gateway in Washington, USA

Report for 208.202.21.56

Analysis: Node '208.202.21.56' was found in 18 hops (TTL=112). Connections to HTTP port 80 are being rejected.

Hop	Err	IP Address	Node Name	Location	ms	Graph	Network
1		212.234.161.254	etsi-bgp-router.etsi.fr	(France)	1	0 571	ETSI
2	1	195.115.3.129	marseille1.esplanade3000.net	(France)	55		Backbone Network
3	1	195.115.0.133	nnc2.esplanade3000.net	(France)	77		Backbone Network
4	4	195.115.0.10	nnc1.esplanade3000.net	(France)	81		Backbone Network
5	3	195.115.0.86	New-York.esplanade3000.net	(France)	166		Backbone Network
6		207.45.201.129	gin-nyy-bb5.TELEGLOBE.net	New York, NY, USA	167		Teleglobe Inc.
7		207.45.223.66	gin-nyy-bb1.TELEGLOBE.net	New York, NY, USA	323		Teleglobe Inc.
8	3	157.130.4.165	Serial0-1-0.GW2.NYC2.ALTER.net	New York, NY, USA	184		UUNET Technologies, Inc.
9	2	137.39.31.101	422.ATM11-0-0.CR2.NYC2.ALTER.n	New York, NY, USA	187		UUNET Technologies, Inc.
10	2	146.188.177.42	142.ATM3-0.XR1.EWR1.ALTER.net	Newark, NJ, USA	170		UUNET PIPEX
11	1	146.188.176.66	100.ATM2-0.TR1.EWR1.ALTER.net	Newark, NJ, USA	180		UUNET PIPEX
12	1	146.188.136.185	105.ATM6-0.TR1.DCA1.ALTER.net	Washington, DC, US/	183		UUNET PIPEX
13	2	146.188.161.173	199.ATM9-0-0.XR1.TCO1.ALTER.net	Tysons Corner, VA, U	157		UUNET PIPEX
14		146.188.160.57	193.ATM11-0-0.GW2.TCO1.ALTER.r	Tysons Corner, VA, U	179		UUNET PIPEX
15		208.202.21.18	-		187		Intelsat
16	2	208.202.21.19	-		212		Intelsat
17	2	192.168.32.33	-		165		(private use)
18		**208.202.21.56**	-		187		Intelsat



Annex A (informative): Conformance

WG6 will provide a the Protocol Implementation Conformance Statements (PICS) for TIPHON systems. This will allow manufactures to identify exactly what implementation options are required to implement TIPHON compliant systems. If manufactures wish to identify their equipment as being TIPHON compliant they have to use the procedure described in the following clause.

Manufacturer declaration of conformity.

DECLARATION OF CONFORMITY WITH TIPHON SPECIFICATIONS / STANDARDS

We ....
(Supplier's name) *(Telephone)*

....
(Address) *(Fax)*

declare under our sole responsibility:

1. the product and / or service	**2. Only advertisements, literature and/or printed materials relating to our products and/or services which are in conformity with all relevant TIPHON specifications will be marked with the TIPHON compliance logo as long as the relevant the specification(s) remain in force.**
.... *(Name, type or model)* to which this Declaration relates, is in conformity with all relevant TIPHON specifications as listed hereafter: .... *(Title and/or number and date of issue of the specification(s) and/or standard(s))* and therefore will be marked with the TIPHON compliance logo, as long as the relevant the specification(s) remain in force.	.... *(Name and signature of authorized person)*

WARNING: THE PRODUCTS/SERVICES LISTED ABOVE HAVE NOT BEEN TESTED BY ETSI FOR CERTIFICATION PURPOSES. ETSI SHALL IN NO WAY BE HELD LIABLE FOR ANY INCONSISTENCY OR MISREPRESENTATION CREATED BYTHE DECLARATION ABOVE.

....
(place and date) *(Name and signature of authorized person)*

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

TIPHON-06 Temporary Document 83 (http://docbox.etsi.fr/tech-org/tiphon/Document/tiphon/05-9802-Santa_Clara/06td83.doc).

TIPHON-05 Temporary Document 49 (http://docbox.etsi.fr/tech-org/tiphon/Document/tiphon/05-9801-Sophia/05td49.doc).

TIPHON10 Temporary Document 40 (http://docbox.etsi.org/tech-org/tiphon/Document/tiphon/05-9808-Portland/09td40.zip).

http://www.infonova.at/tiphonnet

www.vocaltec.com

History

Document history		
V1.1.1	January 1999	Publication

ISBN 2-7437-2733-0
Dépôt légal : Janvier 1999