

VoIP Interconnectivity Lab

THE TEST SUITE

The ALBEDO telecom Labs are built using real networks elements that allow to configure and simulate exactly the same network conditions of the real VoIP networks in a 100% controlled telecom network. The intention is to execute a complete test suite to verify the conformance of VoIP phones, nodes and gateways

The actual Test Suite is made of four families of test:

1. **General verifications** which are related with the management of the system
2. **IP settings:** verifies DNS configuration and IP assignments
3. **SIP Conformity:** intended to verify if the elements are able to generate SIP signaling messages with a correct syntax and are able to understand messages received from remote entities.
4. **VoIP Quality:** intended to verify if the Device Under Test is able to offer an acceptable quality of voice even when the received signal is degraded

Table 1.

ALBEDO Telecom test suite made of four families of test.

Number	Test ID	Class	Name
0001	8348-01	IP - VOIP - General	Management with keypad
0002	8432-01	IP - VOIP - General	Web management
0003	8433-01	IP - VOIP - General	Remote management
0004	8351-01	IP - General	Default settings
0005	8352-01	IP - General	Dynamic IP assignment
0006	11430-01	IP - General	DNS communication with dynamic IP
0007	11397-01	IP - General	DNS communication with dynamic IP (primary DNS server fails)
0008	11431-01	IP - General	DNS communication with dynamic IP (both DNS servers fail)
0009	11433-01	IP - General	DNS communication with static IP
0010	11432-01	IP - General	DNS communication with static IP (primary DNS server fails)
0011	11434-01	IP - General	DNS communication with static IP (both DNS servers fail)
0012	11345-01	IP - General	Port assignment procedure
0013	8357-01	IP - VOIP - SIP	REGISTER method (register without authentication)
0014	10719-01	IP - VOIP - SIP	REGISTER method (register with authentication)
0015	8359-01	IP - VOIP - SIP	REGISTER method (unregister without authentication)
0016	10720-01	IP - VOIP - SIP	REGISTER method (unregister with authentication)
0017	11346-01	IP - VOIP - SIP	INVITE method (successful outgoing call)
0018	11347-01	IP - VOIP - SIP	INVITE method (successful incoming call)
0019	11488-01	IP - VOIP - SIP	INVITE method (outgoing call to a busy line)
0020	11489-01	IP - VOIP - SIP	INVITE method (incoming call to a busy line)
0021	11490-01	IP - VOIP - SIP	INVITE method (session refresh)
0022	11348-01	IP - VOIP - SIP	INVITE method (outgoing call hold)

Table 1.
ALBEDO Telecom test suite made of four families of test.

Number	Test ID	Class	Name
0023	11349-01	IP - VOIP - SIP	INVITE method (line pickup after hold)
0024	11491-01	IP - VOIP - SIP	INVITE method (incoming call hod)
0025	11350-01	IP - VOIP - SIP	INVITE method (3 parties call, join calls)
0026	11492-01	IP - VOIP - SIP	INVITE method (3 parties call, join outgoing call)
0027	11351-01	IP - VOIP - SIP	BYE method (internal phone ends call)
0028	11493-01	IP - VOIP - SIP	BYE method (external phone ends call)
0029	11494-01	IP - VOIP - SIP	CANCEL method (incoming call)
0030	11668-01	IP - VOIP - SIP	CANCEL method (outgoing call)
0031	11353-01	IP - VOIP - SIP	REFER method (blind call transfer)
0032	11352-01	IP - VOIP - SIP	REFER method (call transfer)
0033	11495-01	IP - VOIP - SIP	URI composition depending on register server port
0034	8378-01	IP - VOIP - SIP	RTP with codec G.729
0035	8379-01	IP - VOIP - SIP	RTP with codec G.711A
0036	8380-01	IP - VOIP - SIP	183 Session Progress message reception without SDP
0037	8381-01	IP - VOIP - SIP	183 Session Progress message reception with SDP
0038	8382-01	IP - VOIP - SIP	180 Session Progress message reception without SDP
0039	8383-01	IP - VOIP - SIP	180 Session Progress message reception with SDP
0040	11704-01	IP - VOIP - QOS	Clarity measurements introducing no perturbation
0041	11705-01	IP - VOIP - QOS	Clarity measurements introducing perturbations
0042	11706-01	IP - VOIP - QOS	Clarity measurements introducing no perturbation
0043	15766-01	IP - VOIP - QOS	Delay measurements introducing no perturbation
0044	15767-01	IP - VOIP - QOS	DMTF tone measurement introducing no perturbation
0045	15768-01	IP - VOIP - QOS	Signal loss introducing no perturbation
0046	12397-01	IP - VOIP - QOS	Clarity measurements introducing perturbations
0047	15769-01	IP - VOIP - QOS	Delay measurements introducing perturbations
0048	15770-01	IP - VOIP - QOS	DMTF tone measurements introducing perturbations
0049	15771-01	IP - VOIP - QOS	Signal loss introducing perturbations

A FULL VOIP NETWORK IN A RACK

The laboratory consists of a series of rack-mounted components 19 'to simulate different parts of an IP network. The test shall consist of three distinct subsystems:

1. the subsystem of analysis of VoIP call generation,
2. the production subsystem controlled degradation and incidents on the network
3. subsystem simulation of network services.

The system will be optimized to provide for the measures of the families mentioned but also be considered in designing its future extension to allow testing DSL modems and IPTV set-top boxes.

TEST LABORATORY: NETWORK SERVICES SIMULATION SUBSYSTEM

The test laboratory is designed to be autonomous, that means that it implements all services normally provided by IP networks but without the support of any external network. Services provided by the IP laboratory include IP address assignation, domain name service, network address translation, SIP device registration and SIP call routing. The network services simulation subsystem (NSSS), is in charge of the emulation of these services. This subsystem is made up of the following components:

- **Ethernet Switch (SW01):** Provides connectivity to the VoIP laboratory. It enables connection of different kinds of devices, including control consoles and test devices like VoIP phones. This component is implemented by a Linksys SRW2024 switch with 24 electrical and 2 optical Gigabit Ethernet interfaces.
- **Voice Gateway (VGW01):** This device, implemented by a Cisco 2801 router is at the same time a router that forwards traffic between the laboratory IP networks and a voice gateway that delivers traffic to/from POTS telephones and SIP devices.
- **Domain Name Service (SRV02/DNS) server:** Provides name resolution to the subsystems of the laboratory, including the devices under test.

Testing and management of the IP laboratory is performed from the switch (SW01). Different features are available from different switch ports attached to different VLANs. The VGW01 features are extended by means a VIC-2FXS card that contains two FXS ports (FXS 0/0/0 and 0/0/1) to connect standard POTS phones. The VGW01 configuration enables calls between two or more SIP telephones and also hybrid calls between POTS phones attached to an analog interface and SIP phones connected to Ethernet interfaces.

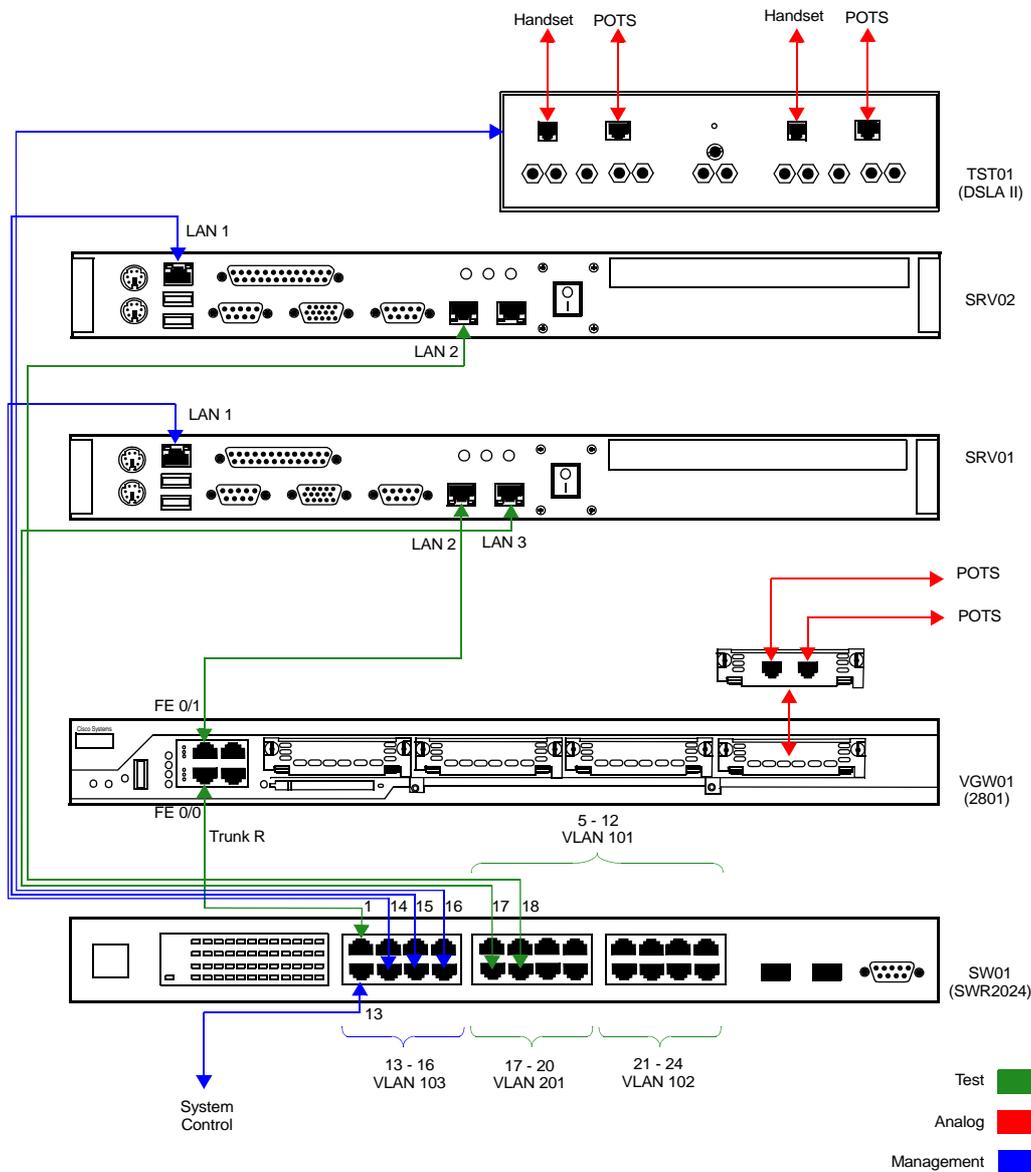


Figure 1. The VoIP laboratory in a rack.

As an additional feature, the VGW01 is configured to act as a SIP proxy and a SIP registrar. As a SIP router, the VGW01 routes calls between SIP telephones attached to the test interfaces (or eventually a remote telephone placed in a different network). As a SIP registrar, it accepts registration request from the SIP devices to be tested. Two configurations are provided, one of them for registrations with authentication and the second for authentication without registration.

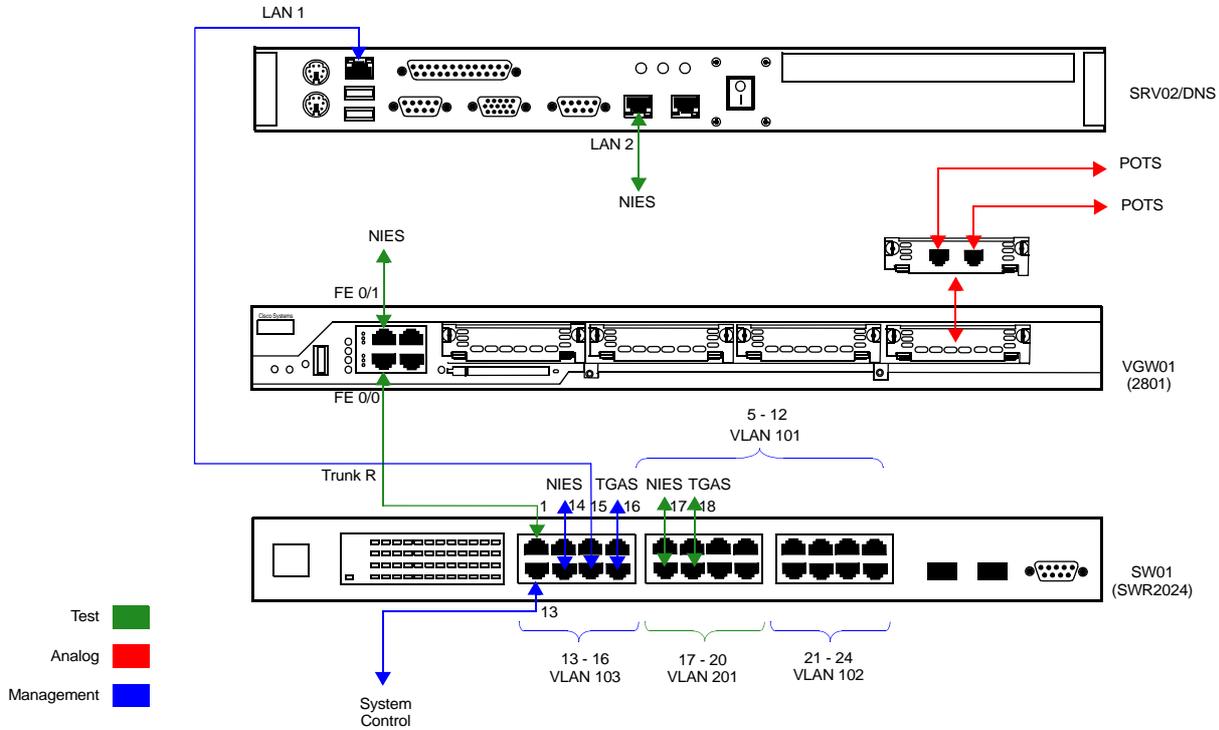


Figure 2. The NSSS includes a switch (SW01) that provides connectivity, a voice gateway (VGW01) for SIP call routing and a DNS server for name resolution installed in the SRV02 (SRV02/DNS component).

MANAGEMENT

The whole laboratory network is managed from a computer connected to the SW01 through an Ethernet interface (the recommended SW01 interface is the one labelled with 13). This computer is referred as the system console through this document. The system console is not considered a component of the laboratory.

consulting + network auditing + maintenance + laboratory

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