NGN TRANSPORT LAB

A View of NGN Transport Lab in TEC, K.L.Bhawan, Janpath, New Delhi

ISO 9001:2008
TELECOMMUNICATION ENGINEERING CENTRE

IN THIS ISSUE

- NGN Transport Lab

1.0 Present telecom technologies/networks are moving rapidly towards IP. Next Generation Networks (NGN) based on IP technologies is poised to register global expansion at a fast pace and it is high time to set up world class testing infrastructure in the country to ensure strict interoperability, end to end performance, benchmarking, secure application delivery, seamless mobility etc., for smooth uptake and growth of NGN in the country. India is also poised to become manufacturing hub for telecom products.

1.1 TEC, the technical arm of DoT, is involved in formulation of Standards and Fundamental Technical Plans, and also bringing out specification of common standards with regard to telecom network equipment, services and interoperability. It also interacts with multilateral agencies like APT, ETSI and ITU etc. for standardization. It develops expertise to imbibe the latest technologies & results of R&D and also provides technical support to DOT and technical advice to TRAI & TDSAT.

To keep pace with the advancement of technology and in order to meet the requirements of setting up NGN test & certifications labs, TEC has taken the initiative to setup following labs in TEC Khurshid Lal Bhawan, New Delhi.

  ➢ Transport Lab
  ➢ Control Lab
  ➢ Service/application Lab
  ➢ Access Lab
  ➢ Customer Premises Equipment (CPE) (including terminals) Lab

1.2   About the Labs

These labs are proposed to be set up in phased manner in such a fashion that different labs classified under separate disciplines in telecom are envisaged to be integrated at the backend into a single test bed.

Each lab has been conceptualized as a test bed created by a host of DUTs (Device Under Test) offered by Telecom Equipment vendors connected in a network configuration. This network would be connected by test equipment that are themselves capable of emulating large virtual networks behind their connecting ports, and subjecting the test bed with simulated traffic relating to different tests. The testing shall require the utilization of multiple scripts (coded programs) that will facilitate automated testing. The test solution providers may have a back-end tie-up with original test equipment manufacturers

These labs are envisaged to be self contained and centrally managed for all test operations and report generation. They are intended to serve Indian and International Telecom equipment manufacturers, Telecom operators, Regulators, Application/Content Service Providers, independent Software developers, R&D Institutions, Educational Institutes, Chipset manufacturers etc., for conformance, performance, functional and interoperability among public networks and to benchmark devices/applications/networks/ services for all real life scenarios.

TEC shall maintain the confidentiality of test results. Test results shall not be shared with any other party without specific advice from concerned applicant. However, clients could publish/advertise/ share test results with due intimation to TEC.

2.0   Transport Lab

To start with and in the first phase, TEC has installed NGN Transport Lab at K.L Bhawan, New Delhi. The lab is equipped with

  ➢ Testing Measurement System for IPv6 Conformance & interoperability.

- Testing Measurement system for L2-L7 testing including Session Border Control Function for IP based network elements
- Router, Firewall, LAN/Ethernet Switch, Blade Server, Management consol and work stations etc.
- Exploitation Room Accessories including, Plasma display unit, overhead projector & screen, heavy duty printer, copier/scanner etc.

Testing Measurement system

The lab has three test equipments from M/s Spirent which is the Original Equipment Manufacturer (OEM), namely Spirent Test Center, Spirent Hawaii Anue and Spirent Abacus. These testing measurement systems support terminations for 10/100/1000 Mbps as well as 10G interfaces, both electrical as well as optical and shall be upgraded to support 40 Gbit/s and 100 Gbit/s interfaces also.

Spirent Test Center

Spirent Test Center is used to measure the performance, functionality and conformance of L2 - L7 equipments under a variety of realistic and worst–case scenarios. The key strength of Spirent Test Center is a deterministic and repeatable test methodology.

Spirent Hawaii Anue

Spirent Hawaii Anue is a ethernet network emulators to create the delays and impairments over the networks for validating and evaluating new products and technologies. From proof of concept to deployment, network impairment emulators provide users with total flexibility in terms of features, line speed, and multi protocol support.
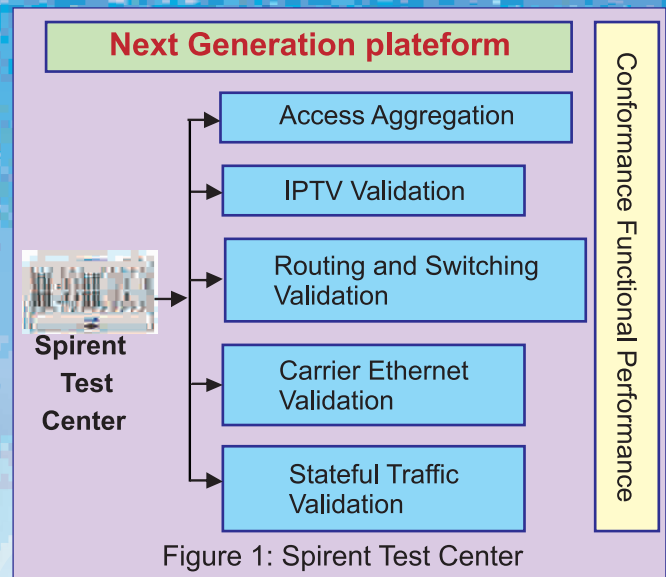

Figure 1: Spirent Test Center

Next Generation plateform
- Access Aggregation
- IPTV Validation
- Routing and Switching Validation
- Carrier Ethernet Validation
- Stateful Traffic Validation

Spirent Test Center

Conformance Functional Performance

Impairment Highlights

- Fixed and random impairment distributions
- Single or bursty
- Random/filtered/targeted impairments
- Chain multiple impairments simultaneously
- Loss of Signal, Loss of Frame Synchronization
- PCS, MAC, and higher layer bit errors, CRC Corruption
- Frame/Packet Drop, Reorder, Duplication Modification
- Bandwidth control or Policing as per Metro Ethernet Forum
- Bandwidth Shaping
- Layer 2-4 checksum correction for higher layer impairments
- Extensive Jitter and Bandwidth control

Spirent Abacus

Spirent's Abacus delivers IP Telephony test systems that help to manage the challenges of VoIP based deployment. With an extensive suite of circuit

generators and test systems, Abacus is a integrated IP and PSTN telephony test system in a single platform. Spirent's Abacus is a flexible and scalable, with integrated analog, TDM and Ethernet interfaces for comprehensive testing of converged network elements.

Abacus 5000 Features

- Telephony related

  ➢ Call generation using SIP, AS-SIP, Skinny, 3PCC, H.235-GRQ, H.323, H.323/Q.931, MGCP/ NCS, H.248.1/Megaco v1 and v2 over UDP, H.248/Megaco over SCTP, ETSI H.248/Megaco, SIP-T, SIP-I, SIGTRAN (M3UA/M2UA, IUA-PRI/IUA-BRI), BICC, 3GPP

  ➢ Call routing/switching using H.248/ Megaco, MGCP/NCS; softswitch emulation

  ➢ SIP Proxy emulation, registrar and call routing

  ➢ IMS Security (IPSec and AKA)

  ➢ SIP Signaling Compression (SigComp)

- Detailed call error reports with failed sequences or messages

- Load Profiling

- Call Tracer—IP ladder diagram displays synchronized information available in a multi-ladder diagram for Analog, SIP, SS7, H.248/Megaco, MGCP T.38 and clear channel

- Video and voice in a single SIP call session

Figure 2 shows the interconnectivity of different equipment in NGN Transport lab. Device Under Test (DUT) can be contacted either on the router or switch or directly to the Spirent Test Center/Spirent Hawaii Anue/Spirent Abacus tester.

The validation testing of lab is in progress. During the progress of validation and thereafter, the lab shall be open to be used for telecom and IT products for the purpose of testing Internet Protocol

(IP) based implementations, both IPv4 and IPv6. DoT has already issued guidelines for phased migration to IPv6 in view of shortage of IPv4 addresses in the country. Details are available at www.dot.gov.in.

The IPv6 test bed installed in NGN Transport Lab provides IPv6 test cases, including conformance and interoperability tests for the core IPv6 protocols supported by hosts (laptops, servers, PCs, etc.) and routers. Testing capability for IPv6 Core Protocols, IPsec, Internet Key Exchange (IKEv2), Network Mobility (NEMO), Mobile Internet Protocol version 6 (MIPv6), Dynamic Host Configuration Protocol for IPv6 (DHCPv6), Session Initiation Protocol (SIP) functionalities also exist in the lab.

Apart from Layer 2 and Layer 3 protocols in NGN environment for the Data networking/ switching equipments such as routers, Firewalls, LAN switches etc, the lab shall test Session Border Controller functionalities and features such as QoS management, Signaling protocol interworking, NAT, Firewall, Protocol translation, codec support and negotiation. Media Gateway and Media Gateway Controller/Softswitch can also be tested for various protocols/features.

Initially, the equipment (DUT) shall have to be brought to the lab premises and the report of the tests performed shall be made available. The lab shall have facility for remote testing also. The Test Fee for testing the device will be based on the 'Tariff Categories' as given in TEC web-site. The category will be decided after evaluating man-hours requirement for testing the DUT.

3.0   Testing Capability as per IPv6 Forum

(i)   IPv6 Core Protocols like Internet Control Message Protocol for IPv6 (ICMPv6) which enables hosts and routers that use IPv6 communication to report errors and send
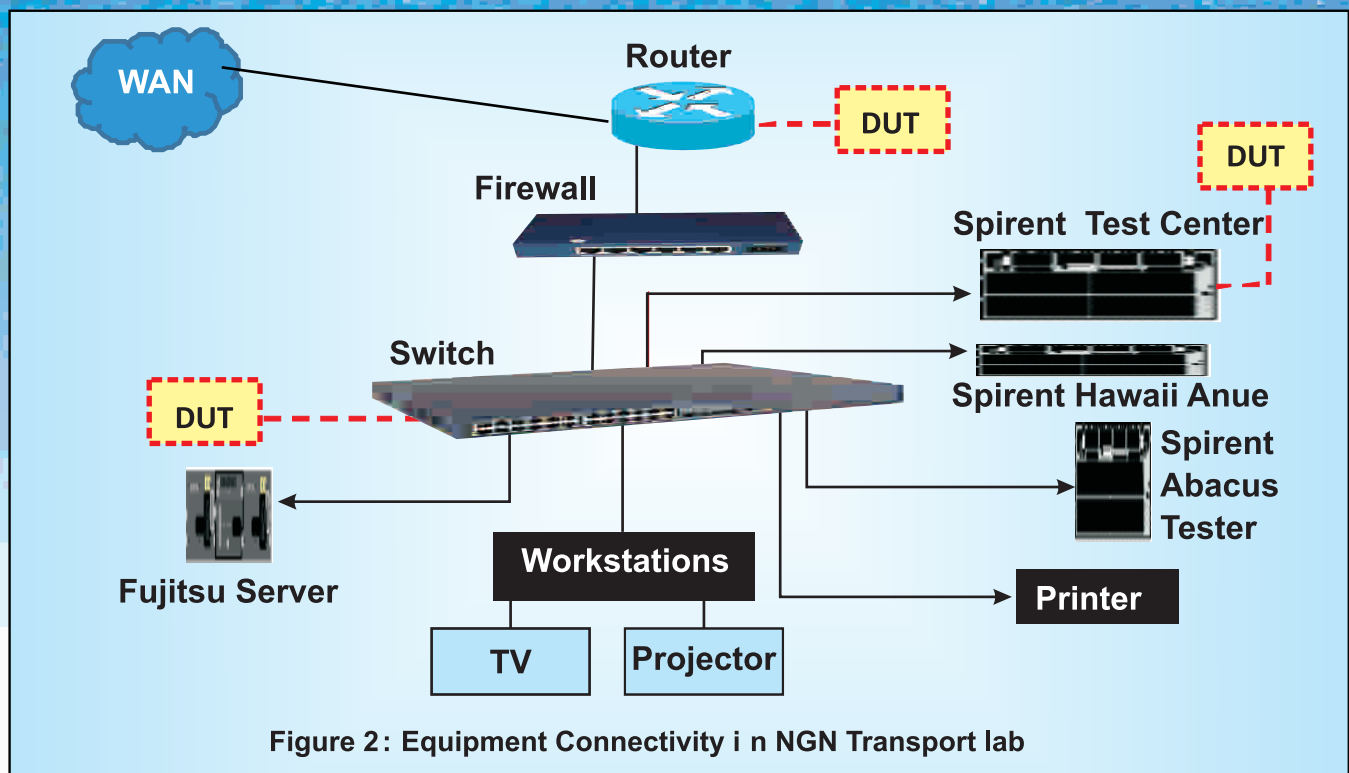
Figure 2 : Equipment Connectivity i n NGN Transport lab

simple echo messages, Multicast Listener Discovery (MLD) which enables one to manage subnet multicast membership for IPv6.

(ii) IPsec which is a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a communication session.

(iii) **IKEv2** which is the protocol used to set up a security association (SA) in the IPsec protocol suite.

(iv) **MIPv6** is the IP mobility implementation for the next generation of the Internet Protocol, IPv6

(v) **NEMO:** The growing use of IP devices in portable applications has created the demand for mobility support for entire networks of IP devices. Network Mobility (NEMO) solves this problem by extending Mobile IP.

(vi) **DHCPv6** is the Dynamic Host Configuration Protocol for IPv6. DHCPv6 may be a more suitable solution to assign addresses, nameservers and other configuration information as being done today with DHCP for IPv4.

(vii) SIP (Session Initiation Protocol) is an IETF-defined signaling protocol widely used for controlling communication sessions such as voice and video calls over Internet Protocol (IP).

(viii) Management (SNMP-MIBs) is a Management Information Base, a key component of SNMP (Simple Network Management Protocol). More specifically, an MIB is a group of managed objects within a network.

(ix) MLDv2 Interoperability Tests (RFC 3810, RFC 4604)

(x) MLDv2 Router Conformance (RFC 3810, RFC 4606)

"National IPv6 deployment Roadmap"

- IT eco-system in India is working fast towards adopting Ipv6

- All major Service providers (having at least 10,000 internet customers or STM-1 bandwidth) have strived to handle IPv6 traffic and offer IPv6 services by December-2011

- All central and State government ministries and departments, including its PSUs have geared up to start using IPv6 services after March-2012

Recommendations of NGN-eCO Core group of TRAI

(i) The physical connectivity between tw NGN operators has to be through a devic having Session Border Controllers (SBC) functionality.

(ii) The interconnection between two NG operators must be tested by standar independent test agency like TEC.

(iii) Following standards based signallin protocols must be supported by NG Networks:

- SIGTRAN - between PSTN/PLMN and I Networks

- H.248 - between Media Gateway an Media Gateway Controller

- SIP, SIP-T/SIP-I - between two IP network & between PSTN/PLMN and IP networks

- H.323 - for international Connectivity only

- For delivery of content (voice/data/ vide etc.), RTP/RTCP protocol is to be used.

(xi) Session Border Controller (SBC)
The system offers to test the following capabilities, features etc. of SBC as DUT

- SBC Functionality Testing

- SBC as a Firewall

- SBC Performance in Multi-play scenario

- SBC performance with SIP & TCP

- SBC Functionality over VPN

4.0 Conclusion

The NGN test lab setup at TEC will enable equipment vendors and Network providers to get their equipments tested for conformance, interoperability, performance, functionality, regression, stability, analysis/debugging, etc. for IP related functionalities.

5.0 हिंदी कार्यशाला

दूरसंचार इंजीनियरी केन्द्र द्वारा दिनांक २४ फरवरी २०१२ को "हिन्दी व्याकरण" विषय पर कार्यशाला का आयोजन किया गया। श्री विक्रम सिंह, केन्द्रीय हिन्दी प्रशिक्षण संस्थान, राज भाषा विभाग द्वारा इस कार्यशाला में व्याख्यान दिया गया तथा वर्तनी के मूल सिद्धान्तों एवं दैनिक व्यवहार में किस तरह हिन्दी को त्रुटि रहित लिखा एवं बोला जाए, इस पर प्रकाश डाला गया। यह कार्यशाला हिन्दी में काम करने की द्रष्टि से बहुत उपयोगी सिद्ध हुई।

कार्यशाला में भाग लेते हुए अधिकारी एवं कर्मचारीगण

Approvals from January 2012 to March 2012

S.No	Company/Product	S.No	Company/Product
1	Sunren Technical Solutions (P) Ltd	4	Hewlett Packard India Sales(P) Ltd.
1.1	Terminals for connecting PSTN, SCW9055-433	4.1	Router, HPA-MSR-30-16
1.2	G-3 FAX Machine,DELL B 1265 Dnf	4.2	Router, HPA-MSR-30-11E
1.3	V.90 Modem (PC Add On,Analog)	4.3	Router,HPA-MSR 30-11F
1.4	Black Berry P 9981 Smart Phone (REQ 71 UW)	4.4	Router, HPA-MSR 50-40
1.5	Terminals for connecting PSTN, ConvergePRO880TA	4.5	G-3 FAX Machine , SNPRC-1102-02
1.6	Terminals for connecting PSTN, MAX EX	4.6	G-3 FAX CARD, BOISB-1102-00
1.7	Switching node with N-N interface at STM-1,UMG8900,MSOFTX3000	5	Cisco Systems (I) (P) Limited
1.8	Switching node with N-N interface at 2048Kbps,UMG8900,MSOFTX3000	5.1	IP PABX for Private Use, CISCO-2901
1.9	V.90 Modem (Analog) A40	5.2	IP PABX for Private Use, CISCO-2911
1.10	V.90 Modem (Analog) USR5637-OEM	5.3	IP PABX for Private Use, CISCO-2921
1.11	G-3 FAX Machine,CLX-6260FW	5.4	TCP/IP ROUTER,CISCO AS 5000
1.12	G-3 FAX Machine,CLX-6260FD	6	HCl Infosystems Limited
1.13	G-3 FAX Machine,CLX-6260FR	6.1	EPABX, MX-ONE
1.14	G-3 FAX Machine,CLX-4195FW	7	Team Engineers , Hyderabad.
1.15	G-3 FAX Machine,CLX-4195FN	7.1	High Speed Line Driver,TEAMLINK 4064 L-G 703
1.16	G-3 FAX Machine,SCX-4521FS	7.2	High Speed Line Driver,TEAMLINK 4064 L-V.35
1.17	PABX for Network connectivity, UX2000	8	Nokia India Private Limited
		8.1	Blue Tooth Headset,Nokia BH-110
2	Petan Communications Solution (P) Ltd	9	Motorola Mobility India (P) Ltd.
2.1	EPABX, 3300 ICP controller	9.1	GSM Mobile phone, MB 865(MOCBD)
3	India Medtronics (P) Limited	10	Huawai Telecommunication India Limited
3.1	Terminals for connecting PSTN, 2490G	10	Interface Requirement for Interchange of PR Digital Signal at 2048 Kbps between networks (Optix155/622H)
3.2	Terminals for connecting PSTN, 2490 C	11	Intellicon Private Limited, Ahmedabad
3.3	Terminals for connecting PSTN, 2490 H	11	PABX for Network connectivity, KAREL DS 200

Important Activities of TEC during Jan 2012 to March 2012

Revised/New GRs/IRs
- GR on Signalling Gateway,
- IR on Sigtran,
- GR on Broadband Access on Cable TV Architecture
- GR on BGP/MPLS VPN
- GR on Enterprise Storage Infrastructure
- GR on Intrusion Prevention system(IPS)
- GR/IR on Router
- GR on Metropolitan Area Network (MAN)
- GR on Internet Service Provider Application
- GR on Ethernet to E1 converter
- GR on LAN switch
- GR on High Speed Data tester
- GR on Broadband Remote access server
- GR on ADSL based broadband Network
- IR on Data Interface to G.703 Interface converter
- GR on Hybrid Microwave Radio Equipment
- GR on Millimetre Wave (E-Band) Microwave Equipment
- GR on Synchronous Supply unit (SSU)
- GR on FDMS for Optical Fibre Cable
- GR on Precision Time Protocol(PTP) Grandmaster Clock
- GR on Precision Time Protocol(PTP) Slave Clock
- GR on Universal Mobile Core network,
- GR on Location Based Information System,
- GR on IP Multi-media system,
- GR on Power system based on Renewable Energy
- IR on CLIP Phone
- GR on WIMAX CPE(USB)
- GR on Optical Splitter for PON technology

Approvals issued by TEC during the period from January 2012 to March 2012

Interface Approvals..................36
Type Approvals ....NIL
Certificate of Approvals...........03

TE

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TEC Conducts
Type Approval
Interface Approval
Certificate of Approval
for
Telecom Products

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Region		Phone
Eastern Region	:	033-23570003
Western Region	:	022-26610900
Northern Region	:	011-23329464
Southern Region	:	080-26642900

Activities at
National Telecommunications Institute
- NTI conducted training on NGN, IPV4 & IPv6,
- NTI conducted training on Cryptography, Energy management in telecom,
- NTI conducted training on Awareness and vigilance &disciplinary Proceeding,

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