European operators services conformance testing experience

International training seminar „Conformance testing"
10-11 December, Moscow, Russia
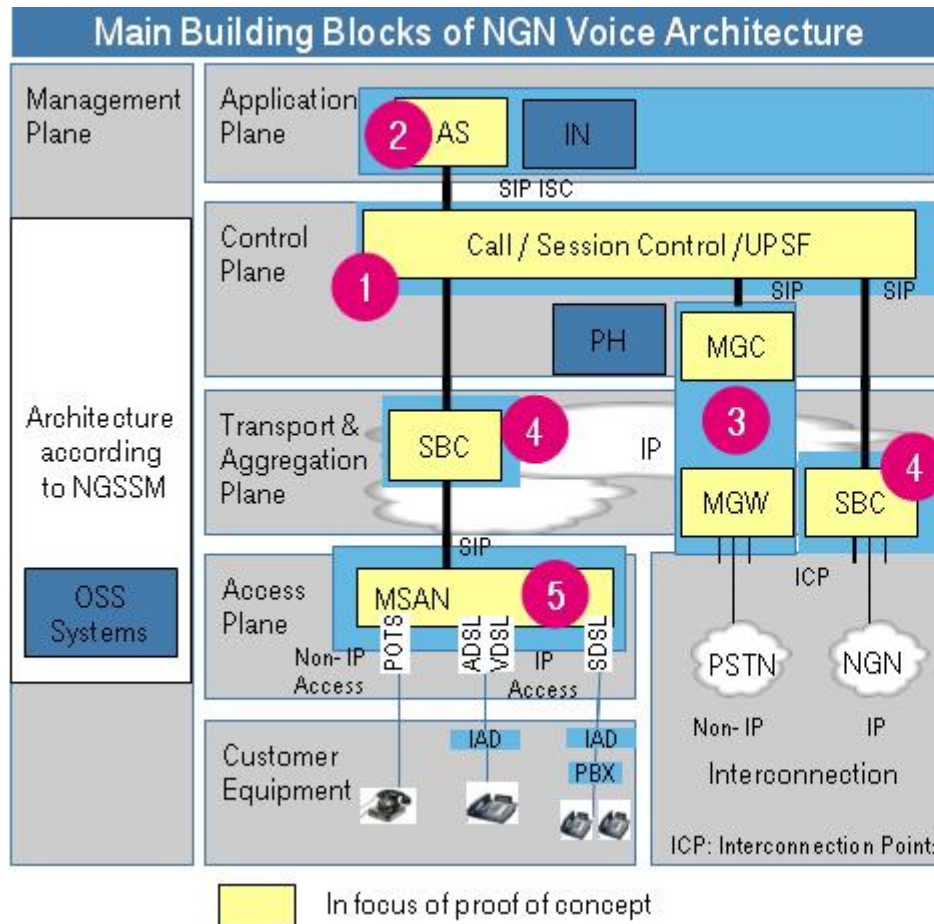Speaker: Denis Alexeitsev

Conformance testing experience

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Proof of concept PSTN substitution
Target NGN voice architecture

Main Building Blocks of NGN Voice Architecture	Description

Main Building Blocks of NGN Voice Architecture

- Management Plane
- Application Plane: ② AS, IN — SIP ISC
- Control Plane: ① Call / Session Control /UPSF, PH, MGC — SIP, SIP
- Architecture according to NGSSM
- OSS Systems
- Transport & Aggregation Plane: SBC ④, IP, ③, MGW, SBC ④
- Access Plane: MSAN ⑤ — SIP, Non-IP Access, POTS, ADSL VDSL, IP, SDSL, Access, ICP
- Customer Equipment: IAD, IAD, PBX
- PSTN (Non-IP), NGN (IP) — Interconnection
- ICP: Interconnection Points
- Non-IP Interconnection, IP Interconnection

☐ In focus of proof of concept

Description

- Five technical building blocks are requested:

① Standard IMS Call control and UPSF (data base)

② Application server for feature termination

③ MGC/MGW for TDM interconnection to ICPs

④ SBC for NGN access & interconnection

⑤ MSAN for indoor and outdoor use with xDSL and POTS linecards

General and functional targets of the project
Targets 1/2

General targets

§ Running testbed for network, operation and IT components

§ Safeguarding of vendor selection

§ Compression of short list

§ Analysis of investment and production costs for the offered components

Functional targets

§ Compatibility of the call-control with the available terminals (for example TOI-Client, Speedport…)

§ Interconnection with PSTN/ISDN through MGC/MG

§ Compliancy to regulatory requirements (LI, emergency call,…)

§ End-to-end quality assessment from the customer view [1]

§ Proof of general component interoperability in a multivendor environment

[1] E2E from the technical functions view, not in a sence of customer process i

General and functional targets of the project
Targets 2/2

IT-Integration
§ Ende-to-end assessment of network management functions and IT integration [1]
§ Proof of functional and non functional interfaces to OSS

Migration proficiency
§ Rating of the migration proficiency of the vendor

Integration proficiency
§ Rating of the integration proficiency of the vendor
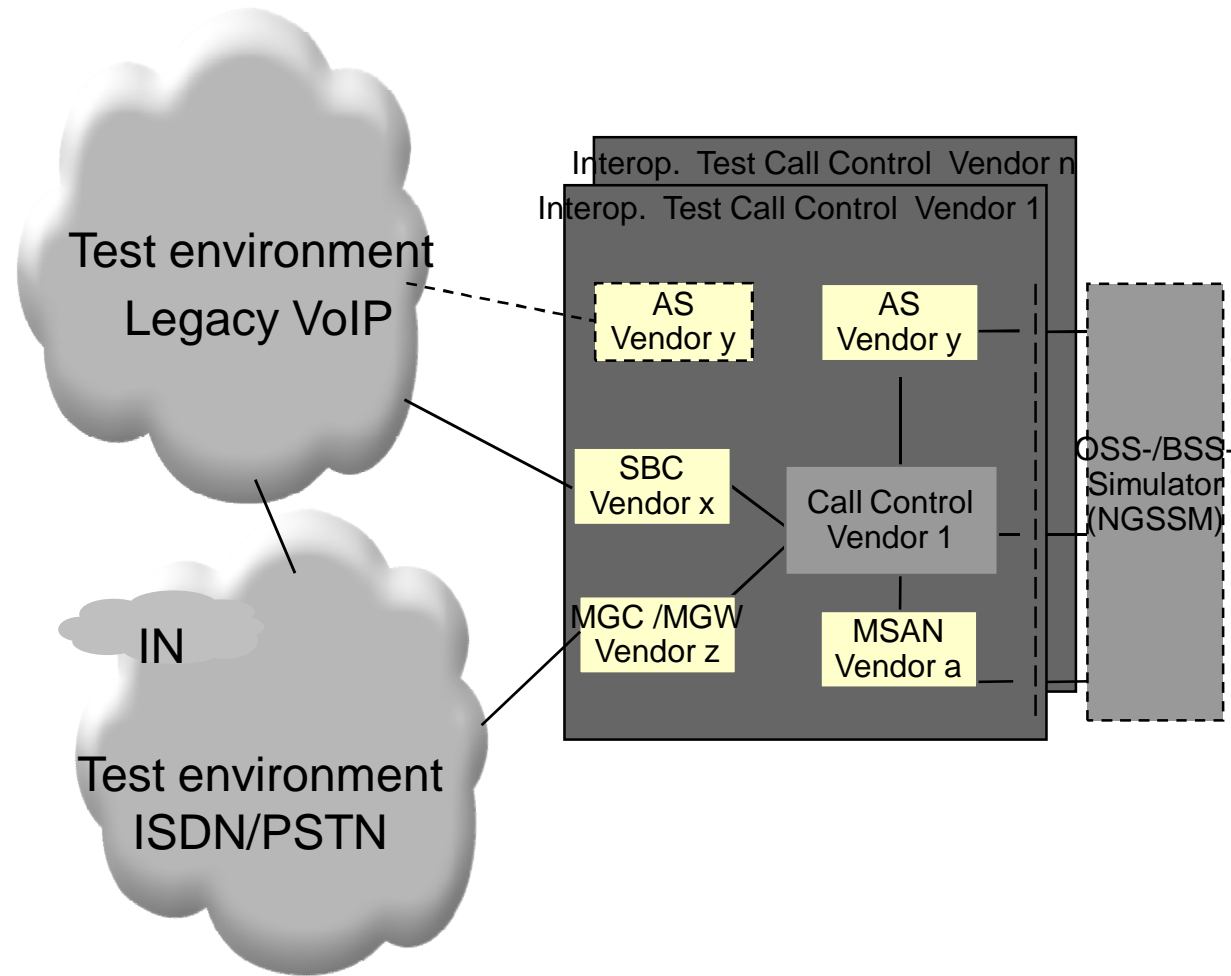
Assessment of the development proficiency
§ Assessment of the vendors capability to realise new requirements in-time and in-quality

[1] E2E from the technical functions view, not in a sence of customer process i

Proof of concept PSTN Migration
Testbed architecture

Proof of concept PSTN Migration
Test matrix

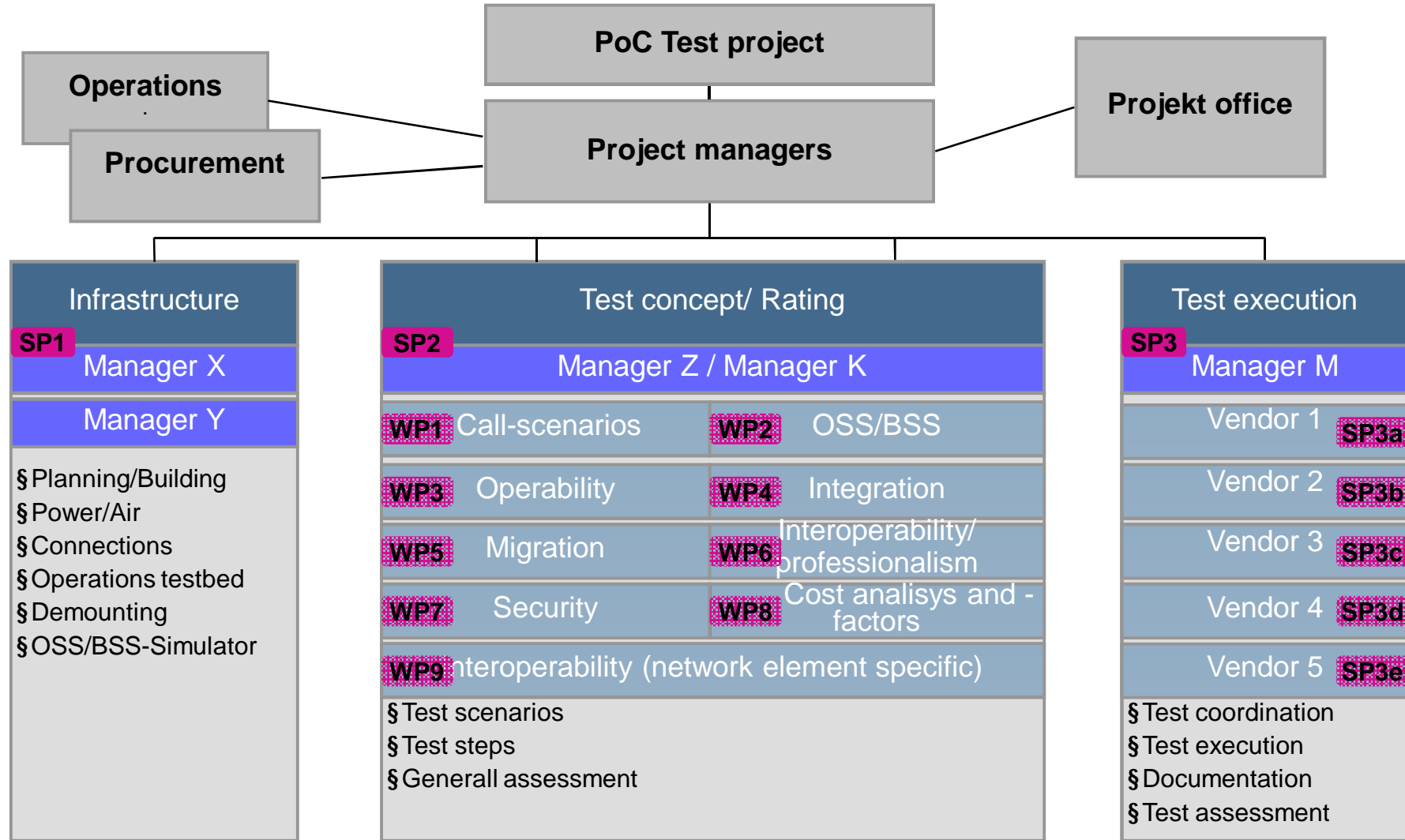| Testbed	CallControl	AS	MSAN	MGC/MG	SBC
#1	Vendor 5	Vendor 3	Vendor 2	Vendor 4	Vendor 3
#2	Vendor 1	Vendor 5	Vendor 4	Vendor 1	Vendor 2
#3	Vendor 3	Vendor 1	Vendor 3	Vendor 5	Vendor 1
#4	Vendor 4	Vendor 3	Vendor 1	Vendor 3	Vendor 4

Test matrix explanation:

- § 5 network elements
- § 5 vendor
- § Not every network element is provided by every vendor

Proof of concept PSTN Migration
Testing project organisation

PoC Test project

Operations

Procurement

Project managers

Projekt office

Infrastructure
SP1

Manager X

Manager Y

- § Planning/Building
- § Power/Air
- § Connections
- § Operations testbed
- § Demounting
- § OSS/BSS-Simulator

Test concept/ Rating
SP2

Manager Z / Manager K

WP1 Call-scenarios	**WP2** OSS/BSS
WP3 Operability	**WP4** Integration
WP5 Migration	**WP6** Interoperability/professionalism
WP7 Security	**WP8** Cost analisys and -factors

WP9 Interoperability (network element specific)

- § Test scenarios
- § Test steps
- § Generall assessment

Test execution
SP3

Manager M

Vendor 1 **SP3a**

Vendor 2 **SP3b**

Vendor 3 **SP3c**

Vendor 4 **SP3d**

Vendor 5 **SP3e**

- § Test coordination
- § Test execution
- § Documentation
- § Test assessment

Proof of concept PSTN Migration
Specific project targets 1/2

- § Standardised features from ETSI TISPAN Release I, i.e OIP, OIR, etc.
- § Overlap Dialling, DDI
- § SIP-ISC interface – multivendor interoperability with AS-Supl.Serv.
- § SIP-ISC interface – telephone number handling at external AS-IN (i.e. RNPS)
- § IN-Call over MGC/MG and PSTN
- § Interconnection with PSTN over existing MGC/MG
- § Interconnection with other IP-IMS domain, legacy VoIP and IP-Interconnection
- § Multivendor interoperability for MSAN and SBC
- § Provisioning of subscribers, record of call records
- § Administration of supplementary services
- § Security check including scan over the network elements
- § Speech quality, connection stability
- § Test of remote configuration
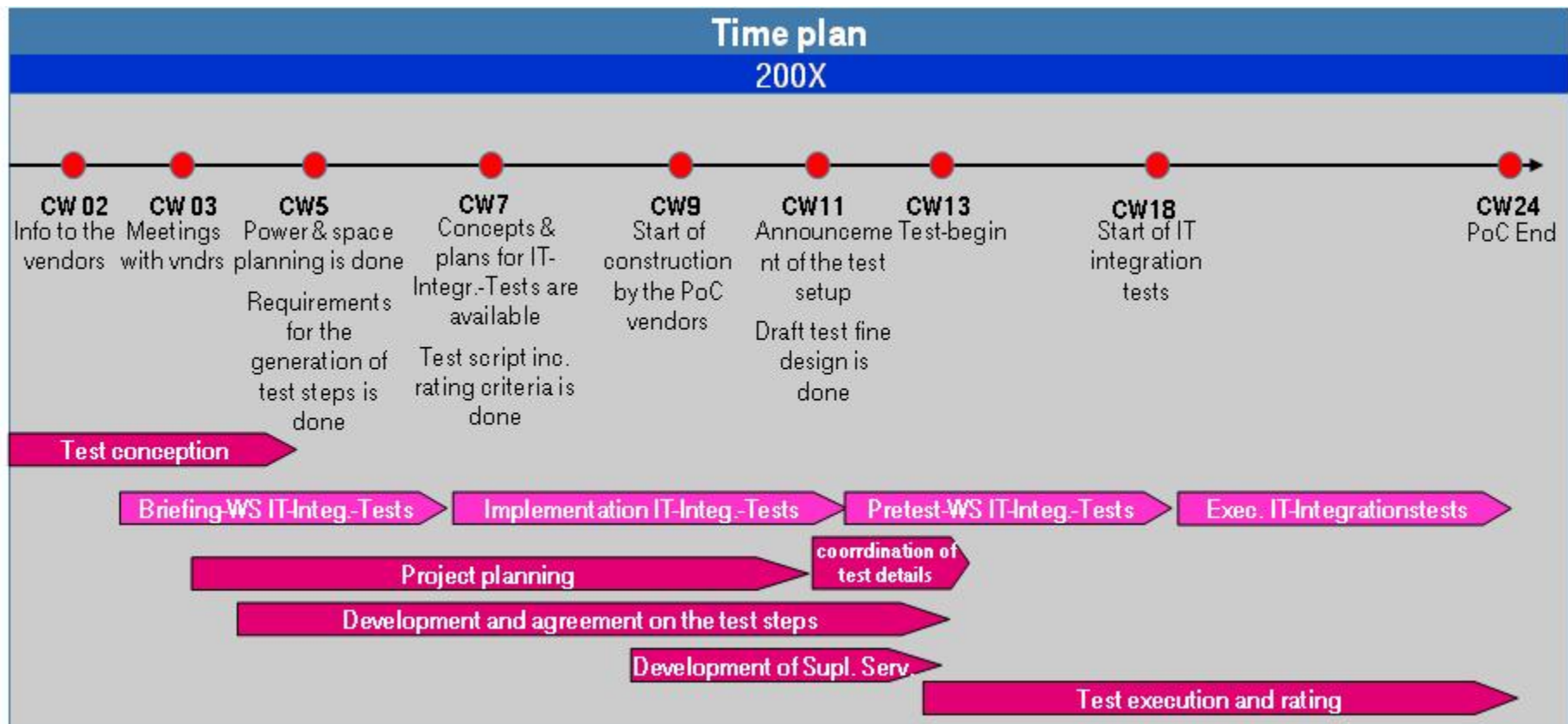- § Test of OSS interface and iteroperability

Proof of concept PSTN Migration
Specific project targets 2/2

§ Proof of element stability, system monitoring, performance management, (overload control, alarm management, redundancy, …)
§ Verification of diagnostic capabilities for fault-clearance and monitoring
§ Test of recovery ability in case of fault, or backup restore
§ Verification of break-in, break-out, on-net and emergency call functions
§ Interoperability of CDRs
§ Usability from the customer point of view
§ Support of the business processes
§ Comparison of production cost factors (for example based on business/test case)
§ Terminal interoperability (TOI-Client, Speedport/FritzBox)
§ Data handling/ data management (network data, fault data)
§ Migration tests
§ Additional features from ETSI TISPAN Release II, z.B. CCBS, CCNR, AOC etc.

Proof of concept PSTN Migration
Project time line

Time plan

200X

CW 02	CW 03	CW5	CW7	CW9	CW11	CW13	CW18	CW24
Info to the vendors	Meetings with vndrs	Power & space planning is done	Concepts & plans for IT-Integr.-Tests are available	Start of construction by the PoC vendors	Announcement of the test setup	Test-begin	Start of IT integration tests	PoC End
		Requirements for the generation of test steps is done	Test script inc. rating criteria is done		Draft test fine design is done			

Test conception

Briefing-WS IT-Integ.-Tests

Implementation IT-Integ.-Tests

Pretest-WS IT-Integ.-Tests

Exec. IT-Integrationstests

Project planning

coordination of test details

Development and agreement on the test steps

Development of Supl. Serv.

Test execution and rating

Proof of concept PSTN Migration
Results of PoC

Result of technical evaluation	V1	V2	V3	V4	V5
AS	🟢	⚫	⚫	⚫	🔴
Call Control	🟢	⚫	⚫	⚫	🔴
SBC	⚫	🟡	⚫	🟢	🟡
MGC/ MGW	🟢	⚫	🟡	⚫	🟡
MSAN	🟡	🟢	🟢	🟢	🔴

🟢 short listed 🟡 with constraints
🔴 not short listed ⚫ not considered

+System integration and processing of test steps from the requirements catalogue was performed by all vendors in time.

+Proof of concept project brought the general evidence of multivendor capability of the IMS NGN concept.

+Based on the PoC results the deployment project with short listed vendors was initiated.

-None of the short listed vendors covered the requested functions and features completely.
-Detailed requirements of the deployment project are much harder to meet for the vendors as compared to the PoC results.

Backup

Proof of concept PSTN Migration
MSAN test cases

Description	Test case total
6.3.1 Remote operability	1
6.3.2 Configuration	8
6.3.3 System stability	8
6.3.4 Analysis, limitation and elimination of operating error	3
6.3.5 Measuring / Performance management	10
6.3.6 Restore ability	10
6.3.7 Maintenance	1
6.6.1 Conformity to the ETSI Tispan IMS standard	1
6.7.2 User administration/Access rights	12
6.7.4 Software requirements	1
6.7.5 Protocoll fuzzing	1

Description	Test case total
7.3.1 Tones	9
7.3.2 Registration of the connections	5
7.3.3 Pots dialing connection	6
7.3.5 CLIP On-Hook and Off-Hook on the analog connection	9
7.3.9 16 kHz – transmission on analog connection	1
7.3.10 DSL interoperability	25
7.3.11 Setting up, deleting, changing, blocking of ports; P-data authorization	1
7.3.12 SNMPv3 agent	1
7.3.13 Inband management	10
7.3.14 SNMP-Traps	1
7.3.15 MSAN configuration	1
7.3.16 Backup/restore of configuration data	6
7.3.17 Testing and measuring	1
7.3.18 Clock and time	5
7.3.19 Mechanical / Construction	1
QoS	1

Proof of concept PSTN Migration
Some of the ETSI telephony supplementary services specifications

Network Integration Testing between SIP and ISDN/PSTN network signalling protocols
TS 186 001-1 1   Part 1: TSS&TP for SIP-ISDN
TS 186 001-2 1   Part 2: ATS and partial PIXIT proforma specification
TS 186 001-3 1   Part 3: TSS&TP for SIP-SIP

Interworking between SIP and BICC or ISUP
TS 186 002-1 1   Part 1: PICS
TS 186 002-2 1   Part 2: TSS&TP for Profile A and B
TS 186 002-3 1   Part 3: TSS&TP for Profile C
TS 186 002-4 1   Part 4: ATS and partial PIXIT for Profile A and B
TS 186 002-5 1   Part 5: ATS and partial PIXIT for Profile C

TIP and TIR - Terminating Identification Presentation & Restriction
TS 186 005-1 1 2 Part 1: PICS
TS 186 005-2 1 2 Part 2: TSS&TP
TS 186 005-3 1   Part 3: ATS and partial PIXIT proforma specification

OIP and OIR - Originating Identification Presentation & Restriction
TS 186 006-1 1   Part 1: PICS
TS 186 006-2 1   Part 2: TSS&TP
TS 186 006-3 1   Part 3: ATS and partial PIXIT proforma specification

CH - Communication HOLD
TS 186 007-1 1   Part 1: PICS
TS 186 007-2 1   Part 2: TSS&TP
TS 186 007-3 1   Part 3: ATS and partial PIXIT proforma specification

IMS/NGN Performance Benchmark
TS 186 008-1 1   Part 1: Core Concepts
TS 186 008-2 1   Part 2: Subsystem Configurations and Benchmarks
TS 186 008-3 1   Part 3: Traffic Sets and Traffic Profiles

SIP-ISUP Interworking between IMS and CS networks
TS 186 009-1 2 Part 1: PICS
TS 186 009-2 2 Part 2: TSS&TP
TS 186 009-3 2 Part 3: ATS and partial PIXIT proforma specification

CONF - Conference
TS 186 010-1 2 Part 1: PICS
TS 186 010-2 2 Part 2: TSS&TP

CDIV - Communication Diversion
TS 186 014-1 2 Part 1: PICS
TS 186 014-2 2 Part 2: TSS&TP

ECT - Explicit Communication Transfer
TS 186 015-1 2 Part 1: PICS
TS 186 015-2 2 Part 2: TSS&TP

CUG - Closed User Group
TS 186 016-1 2 Part 1: PICS
TS 186 016-2 2 Part 2: TSS&TP

ACR and CB - Anonymous Communication Rejection & Communication Barring
TS 186 017-1 1   Part 1: PICS
TS 186 017-2 1 2 Part 2: TSS&TP

CCBS and CCNR - Completion of Communications to Busy Subscriber & No Reply
TS 186 021-1 2 Part 1: PICS
TS 186 021-2 2 Part 2: TSS&TP

CW - Communication Waiting
TS 186 022-1 2 Part 1: PICS
TS 186 022-2 2 Part 2: TSS&TP