ITU-D Regional Development Forum
for the Africa Region:

"NGN and Broadband, Opportunities and Challenges"

ITU-T Standards development on NGN and Broadband networks

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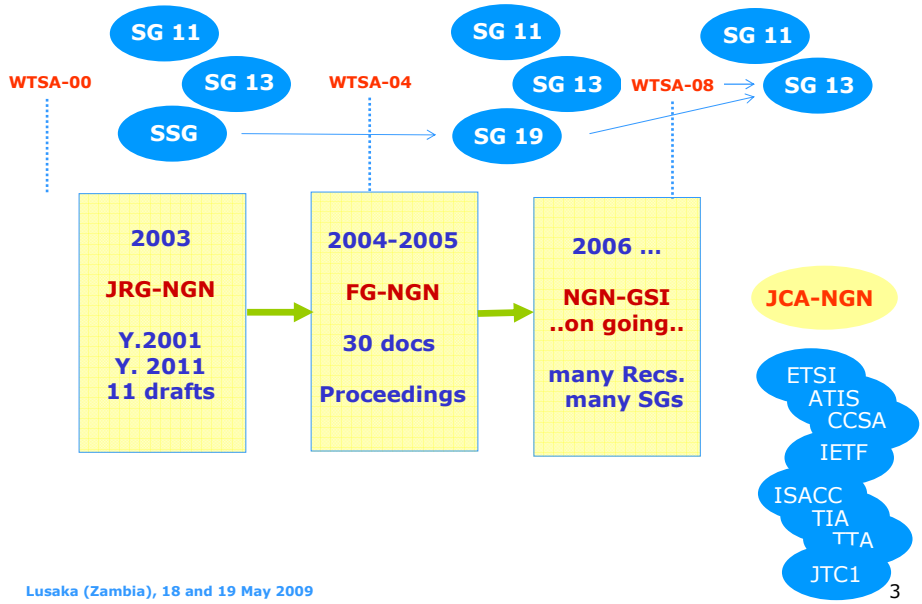
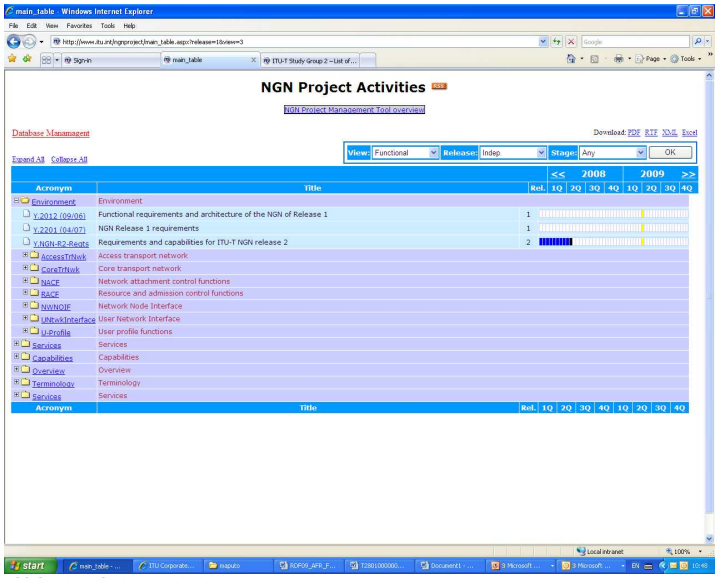
Outline

1. NGN in ITU-T
2. ITU-T SG 13 scope and studies for NGN (incl. Focus Group on Future Networks)
3. ITU-T SG 11 scope and studies for NGN
4. ITU-T SG 15 scope and studies for broadband

NGN in ITU-T



NGN Recommendations: www.itu.int/ngnproject/

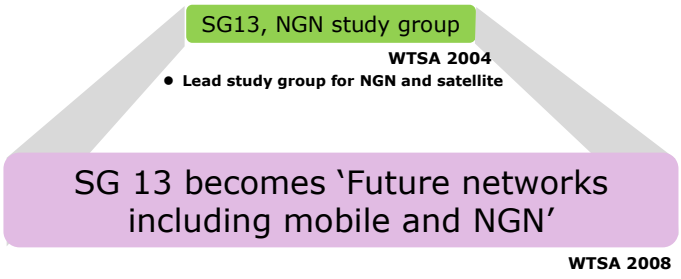


ITU-T study groups for study period 2009-2012

SG 2	Operational aspects of service provision and telecommunications management
SG 3	Tariff & accounting principles including related telecommunication economic & policy issues
SG 5	Environment and climate change
SG 9	Television and sound transmission and integrated broadband cable networks
SG 11	Signalling requirements, protocols and test specifications
SG 12	Performance, QoS and QoE
SG 13	Future networks including mobile and NGN
SG 15	Optical transport networks and access network infrastructures
SG 16	Multimedia coding, systems and applications
SG 17	Security

ITU-T SG 13 role and mandate

Leading study group roles of ITU-T SG 13



- **Lead study group for future networks and NGN**
- **Lead study group on mobility management and fixed-mobile convergence**

Responsibility of ITU-T SG 13 (Res. 2)

Responsible for studies relating to the requirements, architecture, evolution and convergence of future networks. Also includes NGN project management coordination across study groups and release planning, implementation scenarios and deployment models, network and service capabilities, interoperability, impact of IPv6, NGN mobility and network convergence, public data network aspects and network aspects of IdM.

Responsible for studies relating to network aspects of mobile telecommunication networks, including International Mobile Telecommunications (IMT), wireless Internet, convergence of mobile and fixed networks, mobility management, mobile multimedia network functions, internetworking, interoperability and enhancements to existing ITU–T Recommendations on IMT.

Mandate for ITU-T SG 13 (Res. 2)

- **Communication networks aspects**: study for requirements, functional architectures and their capabilities of future networks including NGN according to a layered approach such as transport (access and core), transport control, service control and service/application support functions including support of mobility.
- **Mobile aspects**: *see previous slide*. This study incorporates harmonization with relevant standards which will be developed in mobile related SDOs.
- **Content distribution networks aspects**: study for the requirements, functions and mechanisms to support distribution of contents which are requested by end users. This includes capabilities to support content finding/metadata, content distribution, rights management and media coding. This study incorporates broadcasting and other standards integration within the context of future networks including NGN and mobile communication networks.

Mandate for ITU-T SG 13 (Res. 2)

- **Ad hoc networks aspects**: study of requirements, functions and mechanisms needed to support configuration of ad-hoc networks used for identifying service discovery and activation, and context description/distribution including peer-to-peer networking. This study is based on preliminary work in SG 13 and 19 performed during the previous study period.
- **Common function aspects**: study of functions and relevant capabilities including NGN-specific identity management functional architecture that supports value added identity services, the secure exchange of identity information and the application of bridging/interoperability between a diverse set of identity information formats. Also studied are any identity management threats within the NGN and the mechanisms to counter them. In addition SG 13 studies the protection of personally identifiable information (PII) in the NGN to ensure that only authorized PII is disseminated within the NGN as well as future networks.

Mandate for ITU-T SG 13 (Res. 2)

SG 13 also covers **regulatory issues** including telecommunications for disaster relief and emergency communications.

In order to assist countries with economies in transition, developing countries, and especially least developed countries, in the application of IMT and related wireless technologies, **consults with representatives of ITU–D** with a view to identifying how this might best be done through an appropriate activity conducted in conjunction with ITU–D.

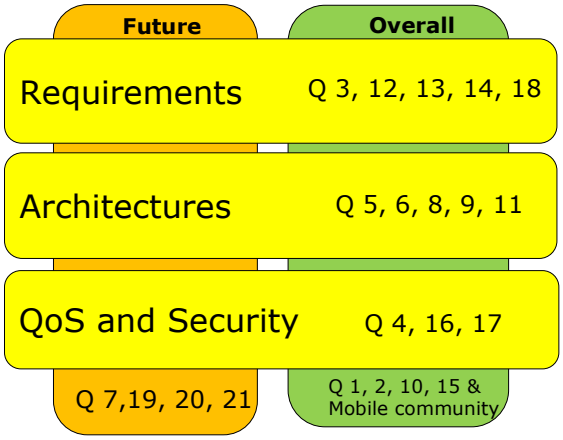
SG 13 maintains **strong cooperative relations with external SDOs and 3GPPs** and develops a complementary programme. It proactively promotes communications with external organizations to allow for normative referencing in ITU–T Recommendations of mobile network specifications developed by those organizations.

SG 13 holds **collocated meetings with SG 11**.

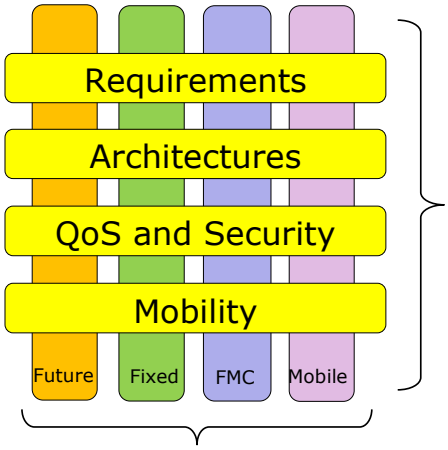
ITU-T SG 13 Questions

Q #	Question title	Features
1/13	Coordination and planning	Overall
2/13	Network terminology	Overall
3/13	Requirements and implementation scenarios for emerging services and capabilities in an evolving NGN	Requirements
4/13	Requirements and frameworks for QoS enablement in the NGN	Req + Arc + QoS/Security
5/13	Principles and functional architecture for NGN (including ubiquitous networking)	Architectures
6/13	Mobile telecom network architecture for NGN	Architectures + Mobile
7/13	Impact of IPv6 to an NGN	Architectures + Future
8/13	Mobility management	Req + Architectures + Mobile
9/13	MM mechanisms supporting multi-connections for multiple access technologies	Req + Architectures + Mobile
10/13	Identification of evolving IMT-2000 systems and beyond	Requirements + Arc + Mobile
11/13	Convergence of existing and evolving IMT and fixed networks	Architectures
12/13	Evolution towards integrated multi-service networks and interworking	Requirements + Arc + Migration
13/13	Step-by-step migration to NGN networks	Req + Arc + Migration
14/13	Service scenarios and deployment models of NGN	Scenario
15/13	Applying IMS and IMT in Developing Country mobile telecom networks	Guidelines
16/13	Security and identity management	Req + Arc + QoS/Security
17/13	Packet forwarding and deep packet inspection for multiple services in packet-based networks and NGN environment	Req + Arc + QoS/Security
18/13	Requirements and framework for enabling COTS components in an open environment	Requirements + Architectures
19/13	Distributed services networking (DSN)	Req + Arc + Future
20/13	Public data networks	Req + Arc + Overall
21/13	Future networks	Req + Arc + Future

Configuration of ITU-T SG 13 Questions

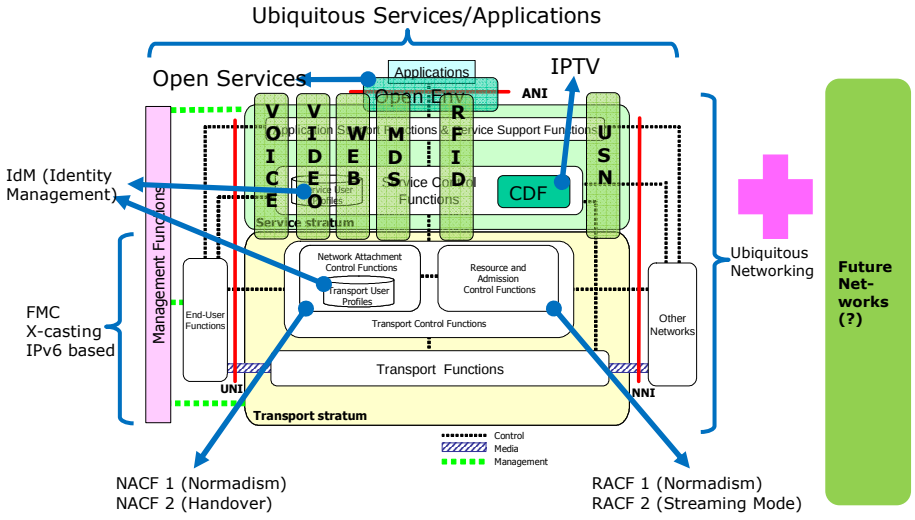


High level view of ITU-T SG 13 work



- NGN
- FMC
- IPTV
- Ubiquitous networking
- USN/RFIDs
- Web based
- Open environment
- Climate change
- Others

Future direction of ITU-T SG 13



Focus Group on Future Networks (FG-FN)

- SG13 in the study period 2009-2012 is "Future Networks including Mobile and NGN" reflecting the importance of "Future Networks".
- There is a new Question on Future Networks: Q.21/13.
- Future Networks have become a part of global agenda such as IRTF (International), GENI/FIND (US), FP7/FIRE (EU), CNGI (China), AKARI/NwGN (Japan), FIF (Korea) as well as ISO/IEC JTC1/SC6.
- The academic community expressed their strong interest in collaborating with the ITU-T on this subject during the last ITU-T Kaleidoscope event in May 2008.
- However, all these activities seems to be in their early stage of investigation.
- Global harmonization between these different activities are extremely important and necessary to build up globally interoperable future ICT infrastructures.
- ITU-T should make all efforts to support the development of global and harmonized frameworks (e.g. requirements, functional architectures and protocols) collaborating with all relevant entities and activities.

Scope of FG-FN

The Focus Group, by collaborating with worldwide future network (FN) communities (e.g., research institutes, forums, academia and etc), aims to

- collect and identify visions of future networks, based on new technologies,
- assess the interactions between future networks and new services,
- familiarize ITU-T and standardization communities with emerging attributes of future networks, and
- encourage collaboration between ITU-T and FN communities.

Objectives of FG-FN

The objective of the Focus Group is to document results that would be helpful for developing Recommendations for future networks.

To achieve this objective the Focus Group will

- gather new ideas relevant to Future Networks and identify potential study areas on Future Networks,
- describe visions of the Future Networks,
- identify a timeframe of Future Networks,
- identify potential impacts on standards development, and
- suggest future ITU-T study items and related actions.

Initial thinking on Future Network study

- For the sake of better understanding of Future Networks, an initial definition of 'Future Networks' developed in Q.21/13 meeting is provided here. And in Q.21 discussion the clean-slate approach was understood as a design principle, not deployment.
- Future Network (FN) is a network which is able to provide revolutionary services, capabilities, and facilities that are hard to provide using existing network technologies.

  Note: FN provides mechanisms that benefit every participant as much as they contribute. It will be studied based on clean-slate approaches.

ITU-T SG 11 role and mandate

Responsible for studies relating to signalling requirements and protocols, including those for IP-based networks, NGN, mobility, some multimedia related signalling aspects, ad hoc networks (sensor networks, RFID, etc.), QoS, and internetwork signalling for ATM, N ISDN and PSTN networks. This also includes reference signalling architectures and test specifications for NGN and emerging networks (e.g., USN).

SG 11 has **three lead study group** responsibilities on **signalling** and **protocols**, on **intelligent networks** and on **test specifications**.

ITU-T SG 11 main results on NGN

SG 11 has completed NGN Protocol Set 1 which constitute a fundamental basis for initial implementations of NGN release 1:

- Signalling architecture for the NGN Service Control Plane (Q.3030)
- Signalling requirements at (SUP-FE) - (I/S-CSC-FE) i/f (Q.Sup.54)
- Signalling requirements at (AS-FE) – (S-CSC-FE) i/f (Q.Sup.55)
- Organisation of NGN Service User Data (Q.Sup.56)
- Signalling requirements to support the emergency telecommunications service (ETS) in IP networks and protocol extensions for the support of IEPS communications (Q.Sup.57 and Amendments to ISUP, BICC and DSS2 protocols)
- NGN NNI and UNI signalling profiles (Q.3401 and Q.3402)
- Interface control protocols for RACF (Q.3300-series)
  - Rs, Rp, Rc, and (PD-PE) - (PE-PE) interface
- NGN testing for the support of the compatibility of NGN technical equipment and services (Q.3900, Q.3901 and Q.3902)

ITU-T SG 11 main results on NGN

- Work was completed in cooperation with ITU-D for development of a handbook for deployment of packet based networks (2009-01)

Network Attachment Control Signalling Requirements and Protocols.

- EAP-based security signalling protocol architecture (Q.3201)
  Note – EAP: Extensible Authentication Protocol
- Authentication protocols for interworking among 3GPP, WiMax and WLAN in NGN (Q.3202.1)

ITU-T SG 11 work plan

Address various additional features and consider initiating work in the scope of an NGN Protocol Set 2 (e.g., IMS, IPTV, WiMAX, RFID).

- Signalling architecture and requirements.
- Session control requiring further work on SIP-based profiles to improve interoperability at UNI and at NNI, as well as for supporting more services and applications;
- Bearer control for support of IPTV and multicast data delivery services, for support of more efficient transfer capabilities such as flow state aware transfer capability;

ITU-T SG 11 work plan

- Resource control for developing additional interface protocols fitting with the RACF enhanced architecture.
- Coordination with regional SDOs including development of a handbook to assist ITU-T members in the deployment of packet-based networks to support PSTN/ISDN services
- NGN network attachment and identification for support of a wider range of access technologies and mobility management requirements.

Accelerate study on:

- Monitoring parameters for NGN protocols
- Service test specification for NGN
- QoS tests specification for NGN
- USN and RFID test specification
- Coordination of work on Emergency Communications within an NGN environment
- Security Coordination For NGN Protocols

Consider, in collaboration with ISO/IEC JTC 1/SC 6 standards for end-to-end multicast

ITU-T SG 11 Questions

WP 1/11	Protocol Architecture and Application Control
Q.1/11	Network signalling and control functional architectures in emerging NGN environments
Q.2/11	Application control and signalling requirements and protocols
Q.13/11	Coordination of work on Emergency Communications within an NGN environment
Q.14/11	Security Coordination For NGN Protocols
WP 2/11	Session, bearer, resource control
Q.3/11	Session control and signalling requirements and protocols
Q.4/11	Bearer control and signalling requirements and protocols
Q.5/11	Resource control and signalling requirements and protocols
WP 3/11	Multicast and attachment
Q.6/11	Coordination of signalling requirements and protocol development
Q.7/11	Signalling and control requirements and protocols supporting network attachment and identification in NGN environment
Q.15/11	End-to-end Multicast
WP 4/11	Test specifications
Q.8/11	Protocol Test Specifications for NGN
Q.9/11	Monitoring parameters for NGN protocols
Q.10/11	Service test specification for NGN
Q.11/11	QoS tests specification for NGN
Q.12/11	NID and USN test specification

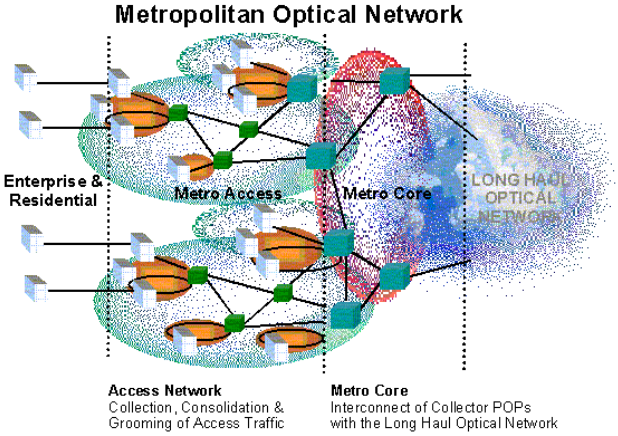
ITU-T SG 11 summary

A significant number of **NGN Protocol Set 1** related Recommendations is available. These Recommendations constitute a major reference to enable **actual NGN implementations** (release 1). Various Supplements have been published to document the corresponding NGN signalling requirements.

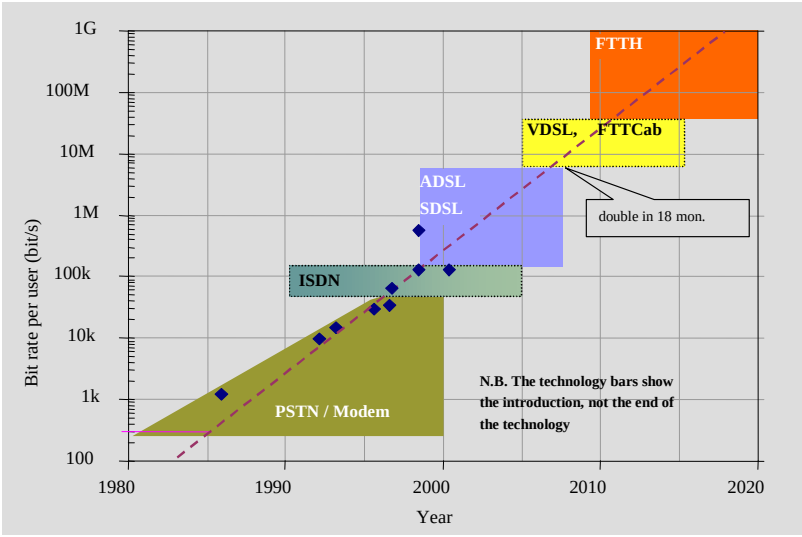
NGN Protocol Set 2 and more Recommendations continue to be developed during this study period (2009-2012) based on the new requirements and feedback from first NGN release implementations.

ITU-T SG 15 role and structure for 2009-2012

Development of standards on optical transport networks and access network infrastructures, systems, equipment, optical fibres and cables, and their related installation, maintenance, test, instrumentation and measurement techniques, and control plane technologies to enable the evolution toward intelligent transport networks. Encompasses related standards for the customer premises (home networking), access, metropolitan and long haul sections of communication networks.



Broadband capacity and technology



ITU-T SG 15 study areas and objectives

Standards for the international telecommunication transport network infrastructure. Lead study group responsibility on access network transport, optical technology and optical transport network in ITU-T.

SG 15: Optical transport networks and access network infrastructures

SG 15 common management policies

- Promotion and workshops contribution
- Technology watch and technology innovation
- Network operator's requirements and market applications
- Bridging the standardization gap

Access networks and home networking

Access network transport

- Home networking
- Enhancement of DSLs
- Future Optical access > 10Gb/s, WDM
- Cost effective broadband access solutions including XDSL/Fibre Hybrid systems
- Powering (including energy saving)

Optical physical infrastructure

Coordination of studies on physical infrastructure characteristics and Transport technologies will be a key point for the success of these studies.

- Expanding the application of WDM
- New fibres and cables for Metro/access
- Better knowledge of the transmission characteristics of the existing fibres and cables

Metropolitan and long-haul networks

Transport network structure

- Future packet-based transport architecture
- Future network structure and interfaces
- Carrier-class NW performance and timing issues
- High resiliency and OAM mechanism
- Network control plane & management elements

Transport network technologies

- Future metro/backbone network
- Ultra-high-speed transmission > 40 Gb/s
- DWDM high capacity transmission
- Key optical components (e.g. amplifiers)
- Full Photonic networking (AON: All Optical Network)

Access network transport: ANT

IEEE802.1 Audio/Video Bridging

IPTV-GSI End terminal

SG 16 H.622, H.622.1

SG 9 CATV J.190

SG 13 (Q5) NGN architecture

SG 15 study areas and hot topics

Home networking

Metallic access

Optical access

Generic architecture and standards coordination of ANT (Q1)

HN architecture G.9970 (G.hnta)

ANT Standards overview

ANT Work Plan

Home Networking transceivers G.9960 (G.hn)

G.9954 HomePNA

PLC

Metallic transceivers (Q4)

DSL bonding G.998

Testing & management

H/SHDSL G.991series

ADSL G.992series

VDSL G.993series

Optical systems (Q2)

PON

GPON G.984series

P2P

Ether P2P G.985

Future access

UPA

CEPCA

HPA

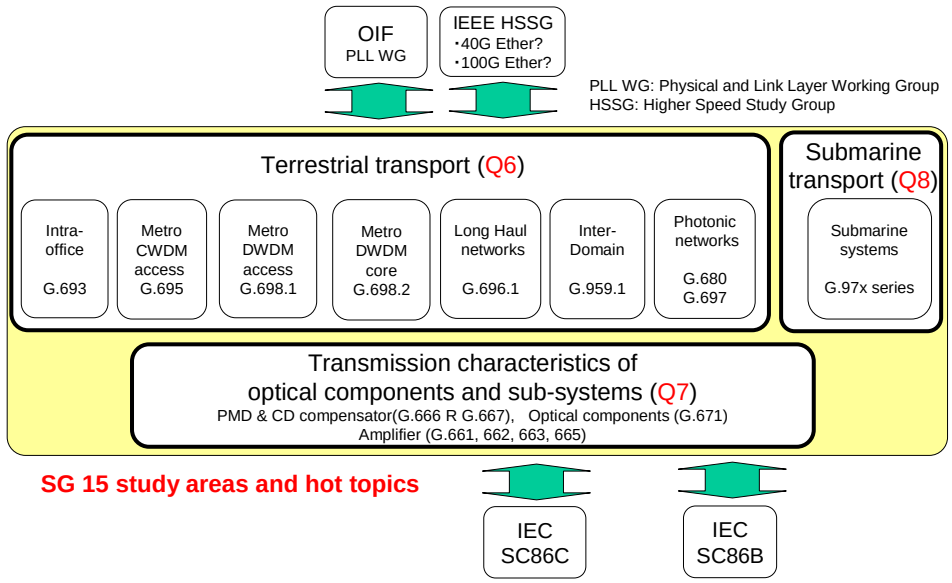
IEEE P1901

MoCA

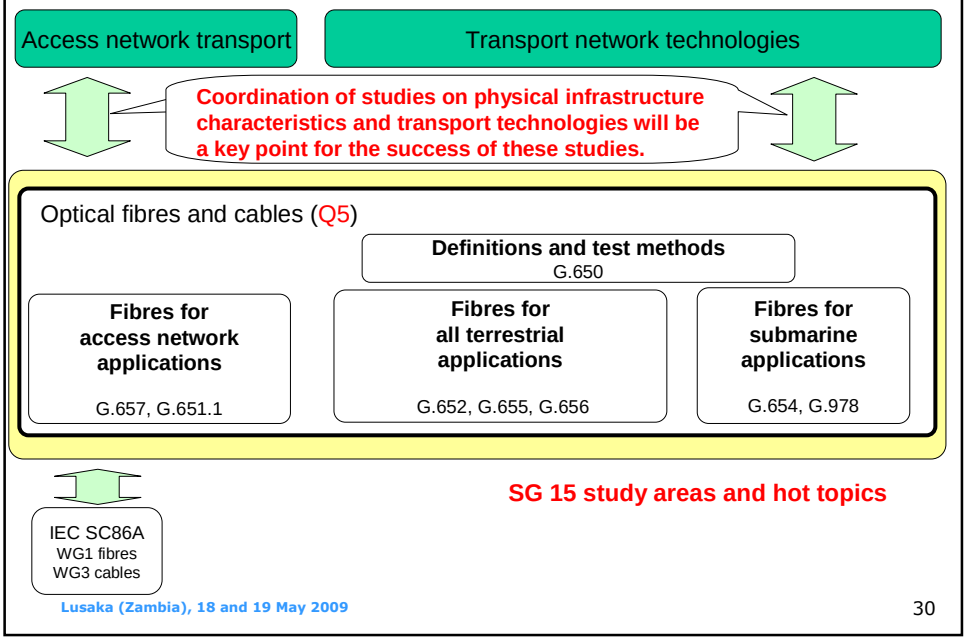
SG5(Q2) EMC

IEEE802.3av 10G-EPON

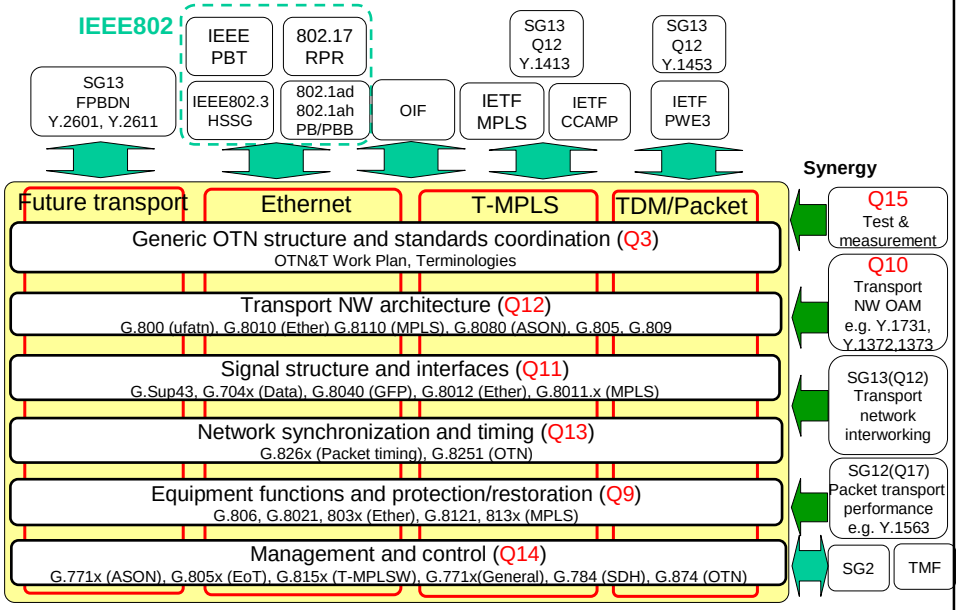
Transport network technologies



Optical physical infrastructure



Transport network structure



SG 15 Study areas and hot topics

ITU-T Study Group 15 Questions

Working Party 1/15: Transport aspects of Access networks and home networking	
Q.1/15	Coordination of Access Network Transport standards
Q.2/15	Optical systems for fibre access networks
Q.4/15	Transceivers for customer access and in-premises networking systems on metallic conductors
Working Party 2/15: Optical access/transport network technologies and physical infrastructures	
Q.5/15	Characteristics and test methods of optical fibres and cables
Q.6/15	Characteristics of optical systems for terrestrial transport networks
Q.7/15	Characteristics of optical components and subsystems
Q.8/15	Characteristics of optical fibre submarine cable systems
Q.16/15	Optical physical infrastructure and cables
Q.17/15	Maintenance and operation of optical fibre cable networks
Q.18/15	Development of optical networks in the access area
Working Party 3/15: Transport network structures	
Q.3/15	General characteristics of transport networks
Q.9/15	Transport equipment and network protection/restoration
Q.10/15	OAM for transport networks
Q.11/15	Signal structures, interfaces and interworking for transport networks
Q.12/15	Transport network architectures
Q.13/15	Network synchronization and time distribution performance
Q.14/15	Management and control of transport systems and equipment
Q.15/15	Test and measurement techniques and instrumentation

ITU-T useful links

- ITU-T study groups www.itu.int/ITU-T/studygroups/index.html
- To contact an ITU-T study group tsbsgxx@itu.int
- ITU-T Recommendations www.itu.int/ITU-T/publications/recs.html
- ITU-T work programme www.itu.int/ITU-T/workprog/wp_search.aspx
- NGN project management www.itu.int/ngnproject/
- Access network transport standards work plan and Access network standards transport overview www.itu.int/ITU-T/studygroups/com15/ant/
- Optical transport networks & technologies standardization work plan www.itu.int/oth/T0901000001/en
- Cooperation between ITU-T and universities www.itu.int/ITU-T/uni/index.html
- ITU-T workshops and seminars www.itu.int/ITU-T/worksem/index.html
  - Forum on "Implementation of decisions of the World Telecommunication Standardization Assembly-08 (WTSA-08)", Accra, Ghana, 16 - 17 June 2009 www.itu.int/ITU-T/worksem/wtsa-08/200906/index.html

Thank you for your attention