What is NGN: Basic Architecture

Keith Knightson
Consultant
Industry Canada
Outline

Set scene for subsequent sessions by:

- Introducing basic concepts
- Showing high-level viewpoints
- List architectural challenges
- Summarize architectural work to date
- Show areas for further study
Next Generation Network (NGN): a packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies.

It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.

From ITU-T Recommendation Y.2001
Y.2011: NGN General Reference Model

Pre-NGN: Vertically Integrated Networks

- Telephony Services
- Data Services (WWW, e-mail, etc)
- Video Services (TV, movie, etc)
- PSTN

NGN: Horizontally Integrated Networks

NGN Transport Stratum

NGN Services Stratum

ITU-T Rec. Y.2011 Far reaching implications
Single Convergence Layer

Any Service and Every Service

Internet Protocol (IP)

Any Transport and Every Transport Technology

Two Service Domains

Scope of “NGN”

Services Stratum

Transport Stratum
Service Provision: Mediated and non-mediated services

Network-based
Mediated Services

Single/Distributed

Application & Service Servers

Service Interconnection

Application & Service Servers

Network-based
Mediated Services

Non-Mediated Services

Packet Access Network(s)

Packet Core Network(s)

Packet Access Network(s)

End User/Application System

Transport Network Interconnection

Transport Network Interconnection

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Effects of Separation

• Universal:
  - Any service over a single IP transport network

• Side Effect:
  - Two different levels of control, authentication, admission, charging, etc.

• Challenge:
  - Service to transport coupling & mapping for:
    - QoS selection
    - QoS control
    - transport resource allocation
    - monitoring
    - accounting for usage

Solution: Resource & Admission Control Functions
Architectural Challenges

- Mobility
  - Fixed to mobile convergence (FMC)

- Application-driven QoS:
  - Classes and their designations
  - Explicit bandwidth selection
  - Service to transport mapping & control
  - Flow awareness
Architectural Evolution

- QoS in Access:
  - Multiple terminals, multiple QoS
  - Role of Home Gateway (shaping, limiting)
  - Home gateway management control

- Distributed network control of/for QoS path:
  - Horizontal means
  - Vertical means
  - Monitoring, dynamic allocations, accounting

- Network Control and Management
  - Protect from attack
  - Separation from payload paths
Fixed to Mobile convergence

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Home Gateway Architecture/Functionality

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Network Terminating Unit
10/100 Base-T

Home Routing Gateway

Customer Premise Network

Desktop PC

Set Top Box

Television

Other Devices, Appliances, etc

Set Top Box

Television

IP phone

QoS per device/terminal

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Summary of key architectural work in SG13 (1)

- **Y.2001: NGN Overview**
  - NGN Definition, Characteristics & Subject Areas

- **Y.2011: General Reference Model**
  - High-level paradigms
  - Separation of concerns, services from networks
  - Architectural principles
  - OSI model relevance
  - G.805 relevance

- **Y.2012 (Y.FRA) Functional Requirements & Architecture**
  - Generic service control functions
  - Generic transport control functions
Summary of key architectural work in SG13 (2)

- **Y.2021 (Y.IFN) IMS for NGN**
  - IMS functions
  - Positioning with respect to Y.FRA

- **Y.2031) Y.PIEA) PSTN/ISDN Emulation Architecture**
  - Call Server based emulation
  - IMS based emulation

- **Y.CSF: Converged Services Framework**
  - Service coordination across heterogenous systems and technologies
  - Overlay architecture across diverse systems
Areas for further study

- Streaming Services
  - IPTV

- Identity based systems
  - RFID

- Home Networks
  - Home Gateways
  - Gateway management
Thank you for your attention.
Backup Slide 1

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Backup Slide 2

NACF

T-15: Home GateWay Configuration FE
T-12: T. User Profile FE
T-11: T. Authentication & Authorization FE
T-14: Access Management FE

RACF

T-13: T. Location Management FE
T-10: Network Access Configuration FE

TC-ON1

S-TC1

S-TC2 S-TC3 S-TC4 S-TC5

TC-T1

TC-T3 (Note 1) TC-T2 (Note 3) TC-T4 (Note 2) TC-T6 (Note 4) TC-T5 (Note 3) TC-T9 (Note 4)

Note 1: applicable when TRC-FE operates in the access network domain
Note 2: applicable when TRC-FE operates in the core network domain
Note 3: applicable when PD-FE operates in the access network domain
Note 4: applicable when PD-FE operates in the core network domain
Applications

A-2: APL-GW-FE*
A-3: APL-SCM-FE*
A-1: AS-FE*
A-4: SS-FE

A-U₁ A-S₁ A-S₂ A-S₃ A-S₄ A-S₅ A-S₆ A-T₁

S-14: MRB-FE
S-15: GSC-FE
S-1: S-CSC-FE
S-13: MRC-FE
S-6: SAA-FE
S-5: SUP-FE
S-4: SL-FE

End User Functions

Service Control Functions

Transport Processing Functions

Note: * may include Authentication, Authorization, and Accounting