# Review and Remaining Issues of New Generation Network (NGN)

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- **NGN developments in other standardization bodies**
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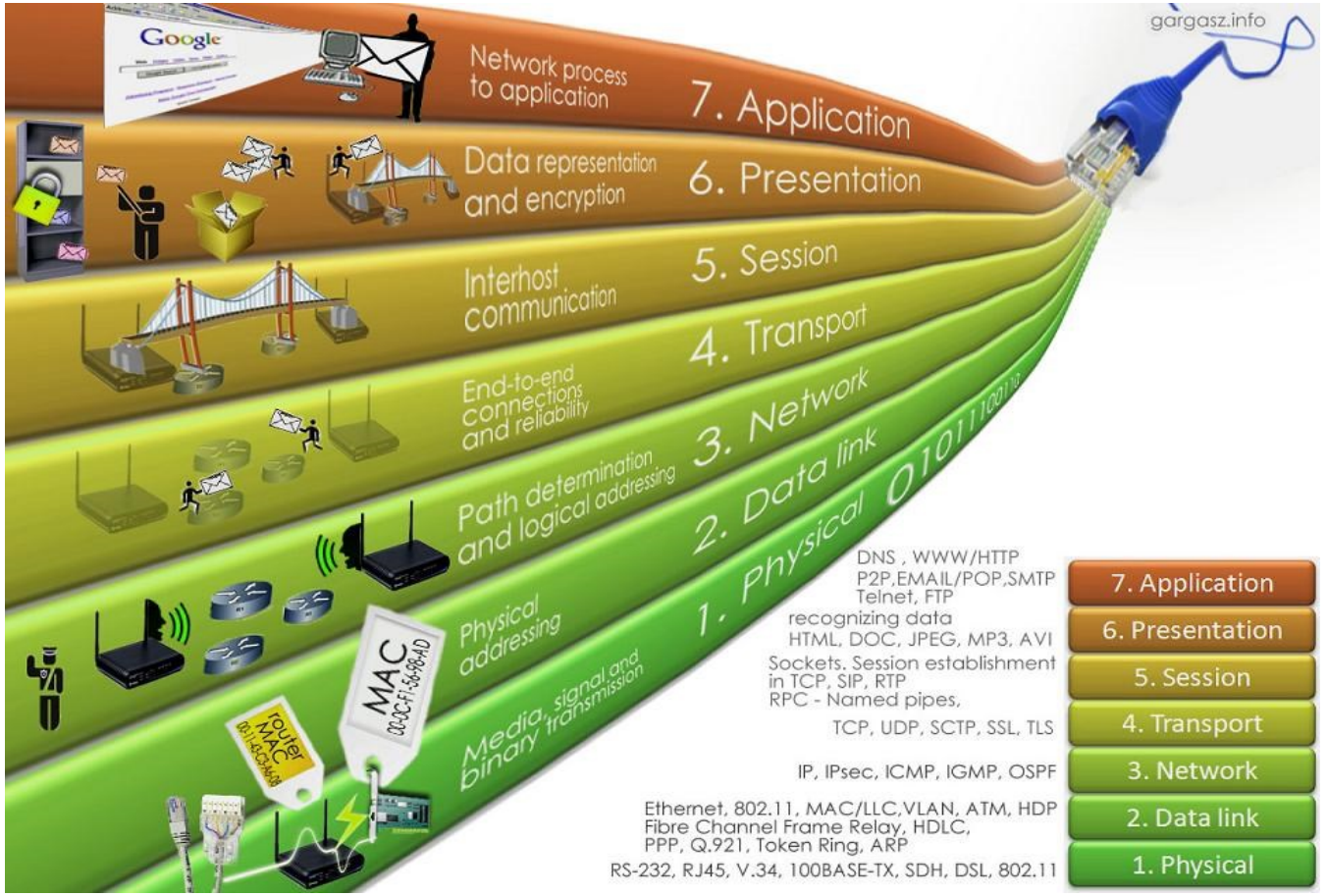
# Current Internet

Based on **OSI model**

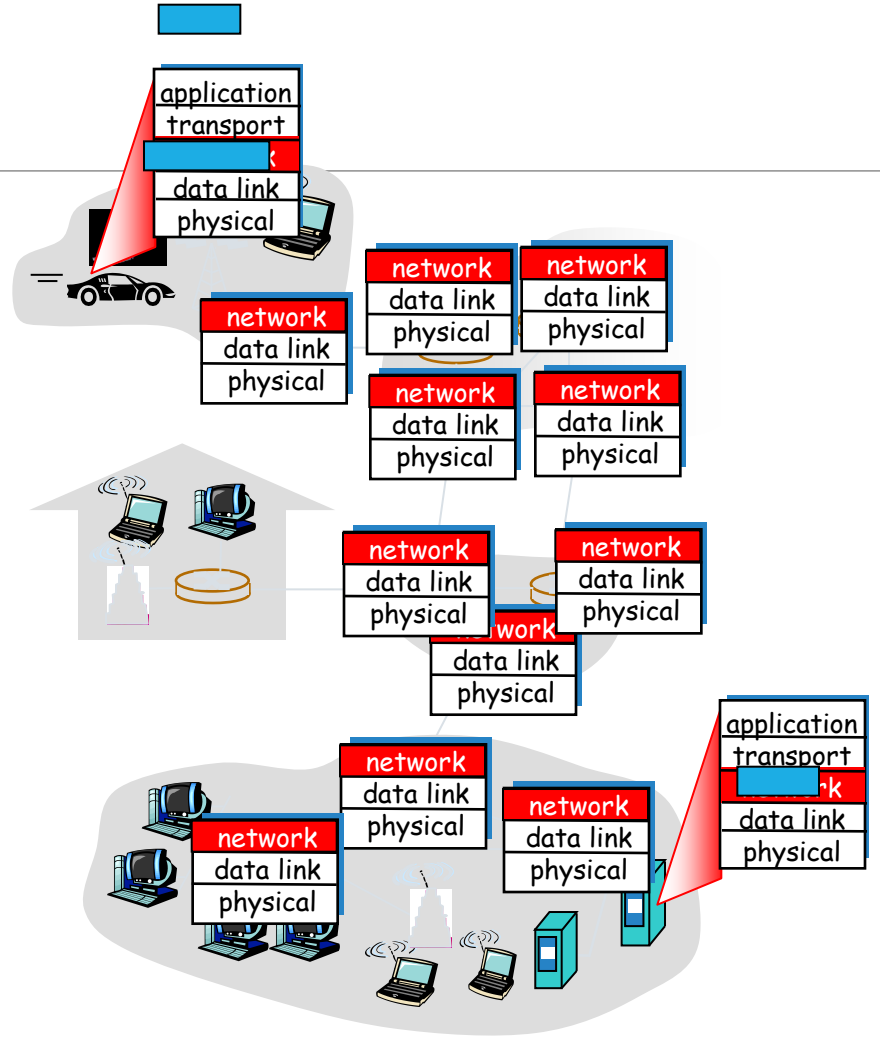
**Encapsulating** data to packets

Find a route from source to destination using **routing functions**

**Forwarding** packets based on route



# Network Layer and Internet Protocol (TCP/IP)



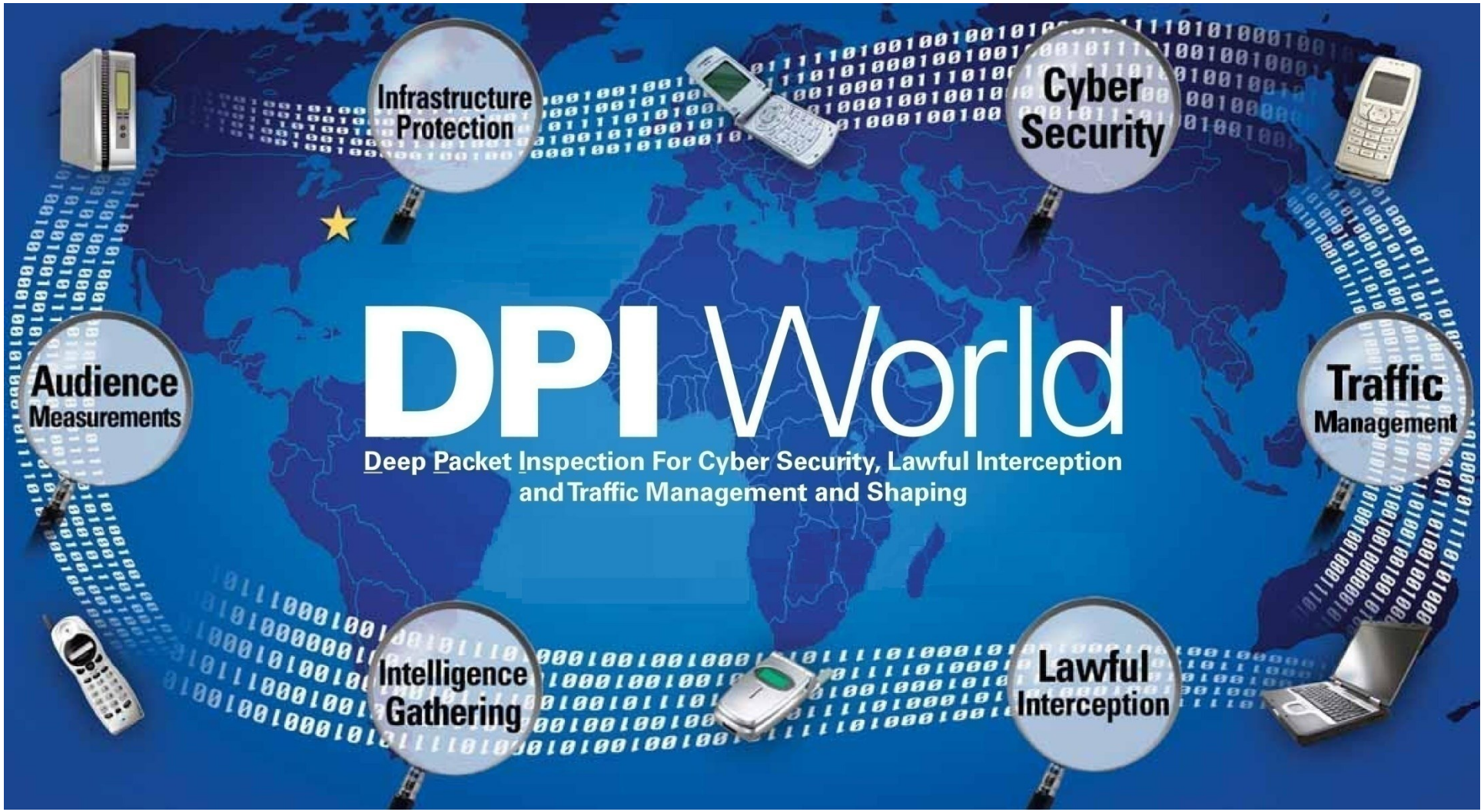
# KISS and Smart Network

- IP Philosophy
- KISS (Keep It Simple and Stupid)

# Coffee Bean



# Deep Packet Inspection



# Government Strategy (The 100th Monkey Effect)

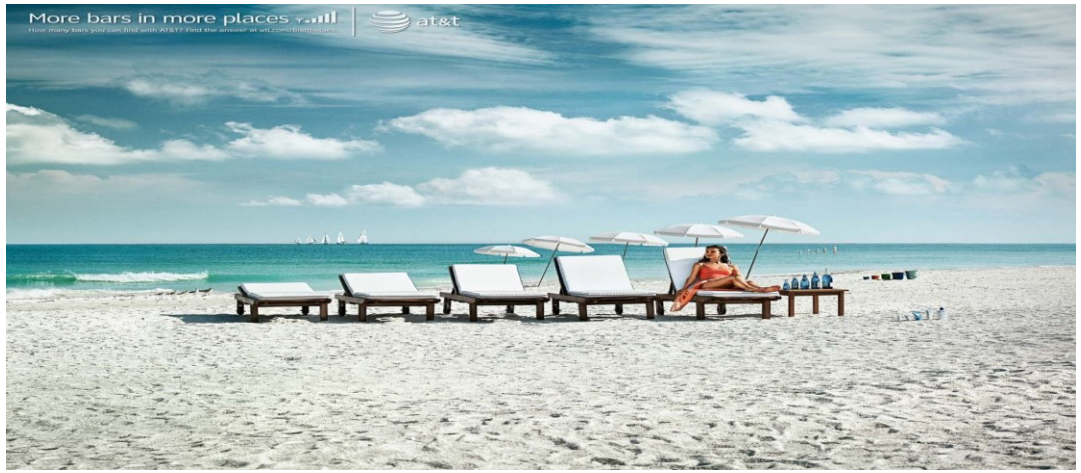
**The Japanese monkey, had been observed in the wild for a period of over 30 years.**
**In 1952, on the island of Koshima, scientists were providing monkeys with sweet potatoes dropped in the sand. The monkey liked the taste of the raw sweet potatoes, but they found the dirt unpleasant.**
**An 18-month-old female named Imo found she could solve the problem by washing the potatoes in a nearby stream. She taught this trick to her mother. Her playmates also learned this new way and they taught their mothers too.**
**This cultural innovation was gradually picked up by various monkeys before the eyes of the scientists. Between 1952 and 1958 all the young monkeys learned to wash the sandy sweet potatoes to make them more palatable. Only the adults who imitated their children learned this social improvement. Other adults kept eating the dirty sweet potatoes.**

**Then something startling took place. In the autumn of 1958, a certain number of Koshima monkeys were washing sweet potatoes -- the exact number is not known.**

**A most surprising thing observed by these scientists was that the habit by a troop of monkeys at Takasakiyama of washing their sweet potatoes began.**

**Thus, when a certain critical number achieves an awareness, this new awareness may be communicated from mind to mind.**

# Government Strategy




AT&T: "*We have more bars in more places.*"

# NGN – Six keys criteria

What is NGN?
=IP Based ISDN

# Comparison between Current-Internet and NGN

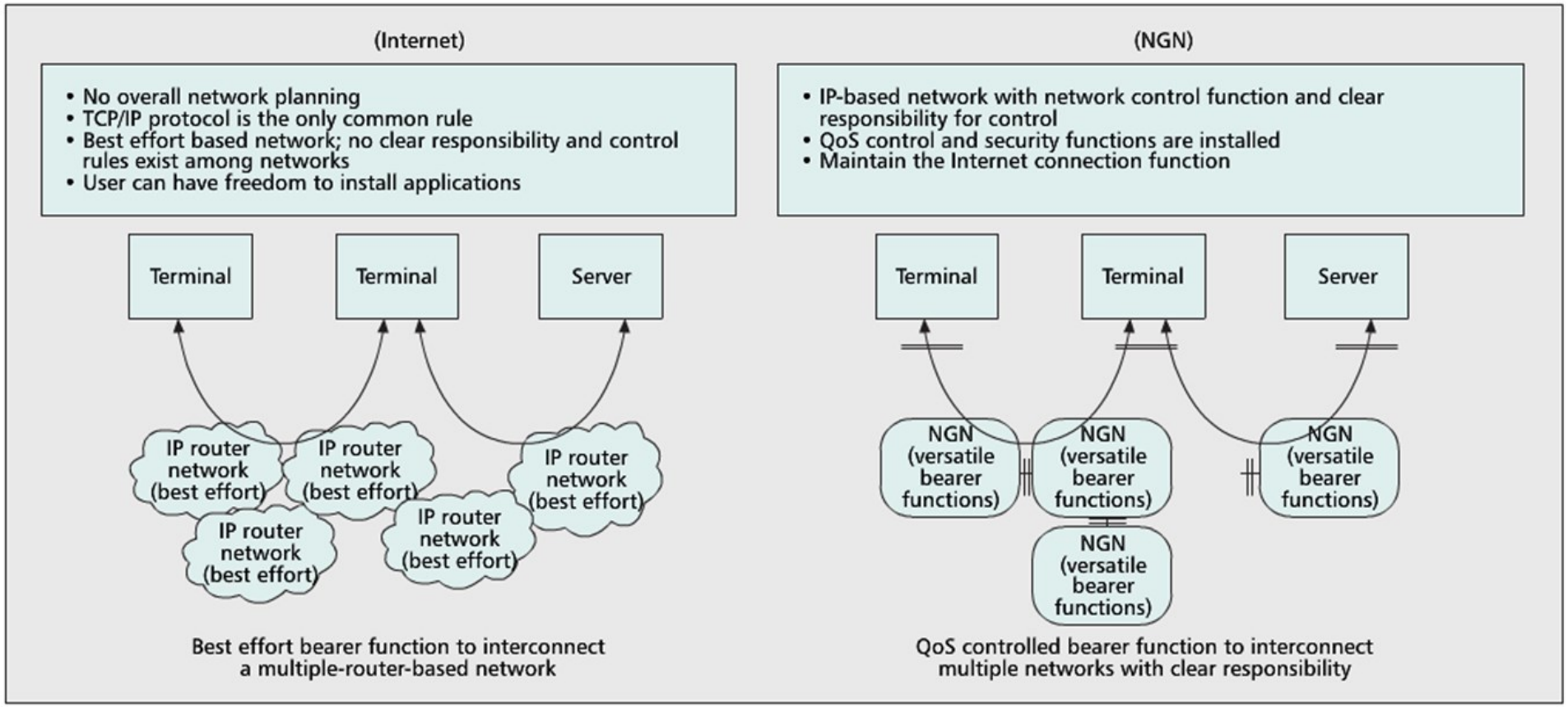
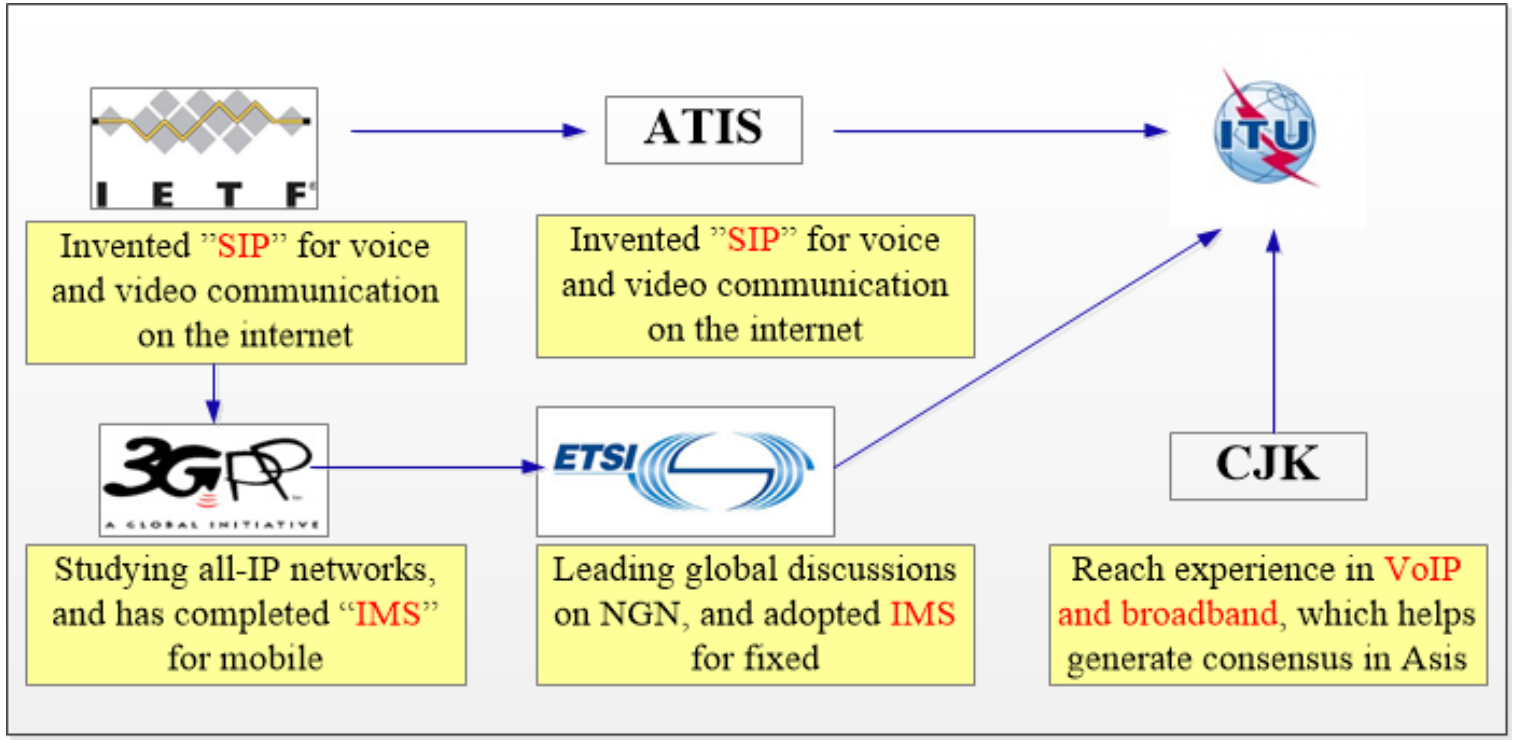



**Figure 2.** *A comparison between the Internet and NGN.*

# NGN – Main issues

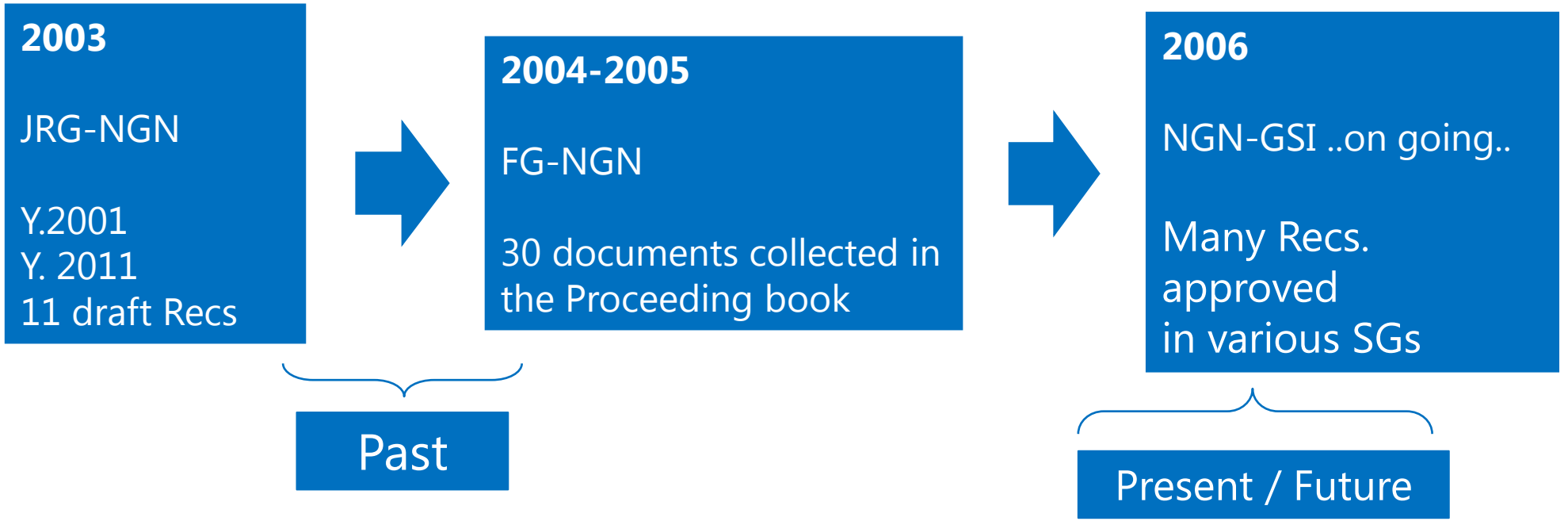
- How to follow quick evolution of technology and services ?
- How to regulate multi-services including simultaneously voice/data/video ?
- How to define new reference networks, architectures and interfaces to new players?
- How to define and quantify dimensioning and costing units for interconnection ?
- How to ensure consistency for regulation principles when different network types coexist in the migration phases ?
- How to consider different network players in the value chain at physical, equipment and services layers ?

# Vigorous activity to standardize NGN




IMS: IP Multimedia Subsystem
SIP: Session Initiation protocol

# ITU-T NGN Milestones



# Main SGs addressing NGN

Almost ALL Study Groups include NGN aspects

SG 13 “Lead study group for NGN”
Functional requirements, services and architectures

# SG13 – Work Highlights

- Achieve standards to enable interworking between two dominant technologies in next-generation networks, **Ethernet and MPLS**.
- **Continue studying NGN evolution**; standardizing enhancements to NGNs as new services and applications emerge.
- Focuses on future networks (FNs)
- Focuses on cloud computing, ubiquitous networking, distributed service networking, ad-hoc networks, network virtualization, software-defined networking, the Internet of Things, and energy saving networks

# NGN Evolution in SG13 (1)

**Question 3/13 - Functional architecture for NGN evolution (NGN-e) including support of IoT and use of software-defined networking**

- Study on general reference models of the NGN evolution for support of IPTV and emerging industry needs.
- Preparation of frameworks to identify the basic architectural compositions of the NGN evolutions such as NICE for support of IPTV.
- Study on general reference models of the NGN evolution for support of IoT.
- Identification of entities, their functions, and reference points, required to provide telecommunications services to support IoT.

# NGN Evolution in SG13 (2)

- Study on using of SDN technologies on the architecture of NGN and its evolution.
- Implementation framework related to provision of emergency telecommunications in Maintenance of existing Recommendations.
- Maintenance and enhancement of the following Recommendations are included: Table 1, Table 2

# SG13 – Table 1

| Release | Title |
|---|---|
| Y.1271 | Framework(s) on network requirements and capabilities to support emergency telecommunications over evolving circuit-switched and packet-switched networks |
| Y.1910 | IPTV functional architecture |
| Y.2001 | General overview of NGN |
| Y.2002 | Overview of ubiquitous networking and of its support in NGN |
| Y.2011 | General principles and general reference model for NGN |
| Y.2012 | Functional requirements and architecture of the NGN |
| Y.2013 | Converged services framework functional requirements and architecture |
| Y.2014 | Network attachment control functions in Next Generation Networks |
| Y.2015 | General requirements for ID/locator separation in NGN |
| Y.2016 | Functional requirements and architecture of the NGN for applications and services using tag-based identification |
| Y.2017 | Multicast functions in next generation networks |
| Y.2017 | Mobility management and control framework and architecture within the NGN transport stratum |

# SG13 – Table 2

| Release | Title |
|---|---|
| Y.2018 | Framework(s) on network requirements and capabilities to support emergency telecommunications over evolving circuit-switched and packet-switched networks |
| Y.2019 | Content delivery functional architecture in NGN |
| Y.2020 | Open service environment functional architecture for next generation networks |
| Y.2021 | IMS for Next Generation Networks |
| Y.2022 | Functional architecture for the support of host-based separation of node identifiers and routing locators in next generation networks |
| Y.2023 | Functional requirements and architecture for the NGN for multimedia communication centre service |
| Y.2031 | PSTN/ISDN emulation architecture |
| Y.2055 | Framework of object mapping using IPv6 in next generation networks |
| Y.2056 | Framework of vertical multihoming in IPv6-based next generation networks |
| Y.2057 | Framework of node identifier and routing locator separation in IPv6-based next generation networks |
| Y.2205 | Next Generation Networks – Emergency telecommunications –Technical considerations |

# SG2 related to NGN

- Proposal to add a new clause to Recommendation ITU-T M.1400 with function codes for **Optical Transport Networks**
- Proposal to **modify Gigabit Ethernet function codes** in Recommendation ITU-T M.1400
- Operational aspects of telecommunication services provision and management

# SG9 related to NGN

- Proposed **System Requirements for Stereoscopic Three Dimensional Television Service over Hybrid Fiber and Coaxial based networks**.
- Proposed RCAS network protocol security specification.
- Transmission of multichannel analogue and/or digital television signals over optical access networks.
- Integrated broadband cable networks in the Democratic Republic of the Congo.
- Proposed new text for Draft New Recommendation J.atrans-spec "Advanced digital downstream transmission systems for television, sound and data services for cable distribution".

# SG11 related to NGN

- Report of the **NGN testing and showcasing** during APT/ITU Conformance and Interoperability event and proposal.
- Proposal to start a new work item on ITU-T M.3170 series of Recommendations conformance testing pilot project.
- Proposed Text for New Work Item "MP2P protocols: Peer Activity Management Protocol (PAMP)" for Nov. 2013 meeting.
- Proposed Update of Q.rrp **"Request routing protocol for content delivery".**
- Proposal of initiating a new Recommendation on Signaling Architecture and requirement for IP based Short Message Service.
- Proposal for scenario and requirements on the orchestration function based on the cloud services.
- Proposed signaling scenarios in Q.IPv6UIP
- Proposal for an IMEI Global System for combating the trade in counterfeit mobile devices.

# SG12 related to NGN

- Propose to change to Recommendation P.863.
- Add appending 3 “Prediction of acoustically recorded narrowband speech”.
- And appendix Ⅳ provides reference speech files for use with Rec. P.863.

# SG16 related to NGN

- Continue develop standards gateway protocol in ITU-T H.248 series, especially for NGN for **OpenFlow, Cloud, DTLS** etc
- Procedures for the control of de-jitter buffers used in PSTN-IP gateways carrying voice-band data.
- H.248.Cloud: Gateway control protocol: Cloudification of packet gateway
- H.248.Shaper: "Gateway control protocol: Traffic shaping (guidelines/packages?)"
- H.248.TLS: TLS session negotiation - Modeling data object "TLS profile".

# SG17 related to NGN

- Proposals on **Cloud Security Components**.
- Proposed revision of Draft X.mgv6 (Security management guideline for implementation of IPv6 environment in telecommunications organizations).
- Proposal of new work item - Guidelines for Personal Information Protection in Cloud Computing.
- Proposal for a new work item on guidelines for using object identifiers (OID) for the Internet of Things.
- Security implication on Software-Defined Networking (SDN).
- Proposal for modifications of X.sgsec-1 : Security functional architecture for smart grid services using the telecommunication network.
- Basic principles to study new security issues (e.g. security for ITS and SDN).

# Development of NGN in ETSI

TISPAN is the ETSI body that specifies:

- Standards for Fixed networks and internet convergence
- Developed the Convergence work Item **(FMC)**
- **Specifies the Next Generation of Networks**: IP Multimedia Subsystem (IMS) that provides an access independent platform for a variety of access technologies (GSM, 3G, 4G, wifi, Cable, fiber and xDSL).

# TISPAN – NGN Release

- **NGN-Release 1:** Dec 2005, defines the overall architecture including IMS re-use and other subsystems. (completion)
- **NGN-Release 2:** Apr 2008, builds upon Rel-1, adding in initial applications like home gateway, IPTV, corporate networks
- **NGN-Release 3:** working from 2009, some release related to IPTV service solution, VoIP consolidation, Home Network interconnection, IP Network to Network interconnection
- Several new areas including: Migration scenarios from CS to PS networks, Ultra broadcast access

# Development of NGN in ATIS

**Focus to develop services includes:**

- Advances High-Quality Video communication at the Cloud level
- Voice over IP(VoIP)
- Mobile Wireless Services (MWS)
- Network Security
- Data Interchange & Billing (DI)
- Wide Area Ethernet (WAE)

# Development of NGN in 3GPP

**Focus to develop services includes:**

- LTE Advanced
- Multimedia Broadcast Multicast Service (Radio higher layer and NW interface specs)
- HeNB Mobility between HeNB and macro
- Location Services
- Heterogeneous network and eICIC(enhanced Inter-Cell Interference Coordination)
- Coordinated Multi-Point transmission and reception (CoMP)

# NGN in other groups

## NGN Management Focus Group (NGNMFG)

- Develop set of interoperable specifications as solution for the management of NGN services and networks.
- Develop NGN Management Specification Roadmap for Release 1

## Open Communications Architecture Forum (OCAF)

- Set of components for a new carrier grade open platforms that will accelerate deployment of NGN infrastructure and services

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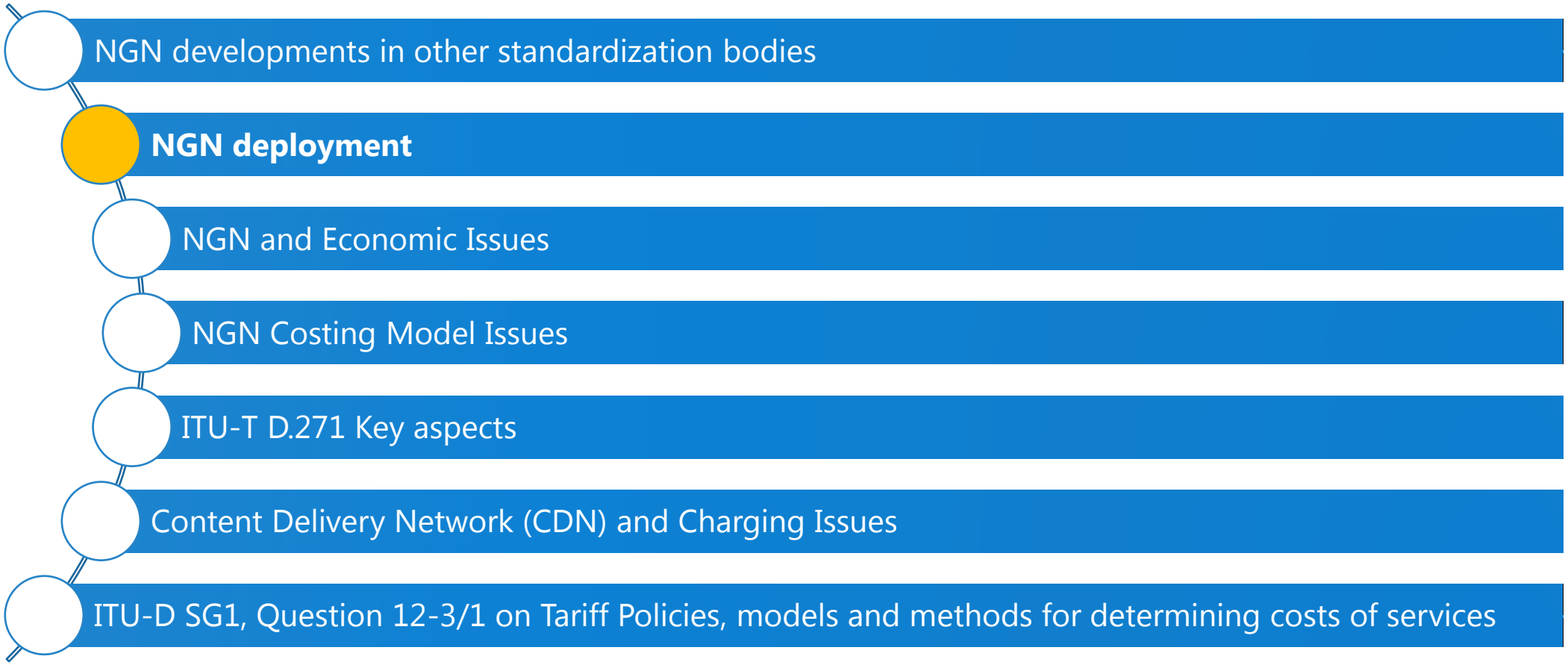
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# NGN Deployment – Case studies

- Communication in Enterprise
- IPTV deployment in NGN
- IMS-based multi-network convergence solution
- Fixed mobile convergence – FMC
- Communication between Corporate Telecommunication Network (CN) via NGN

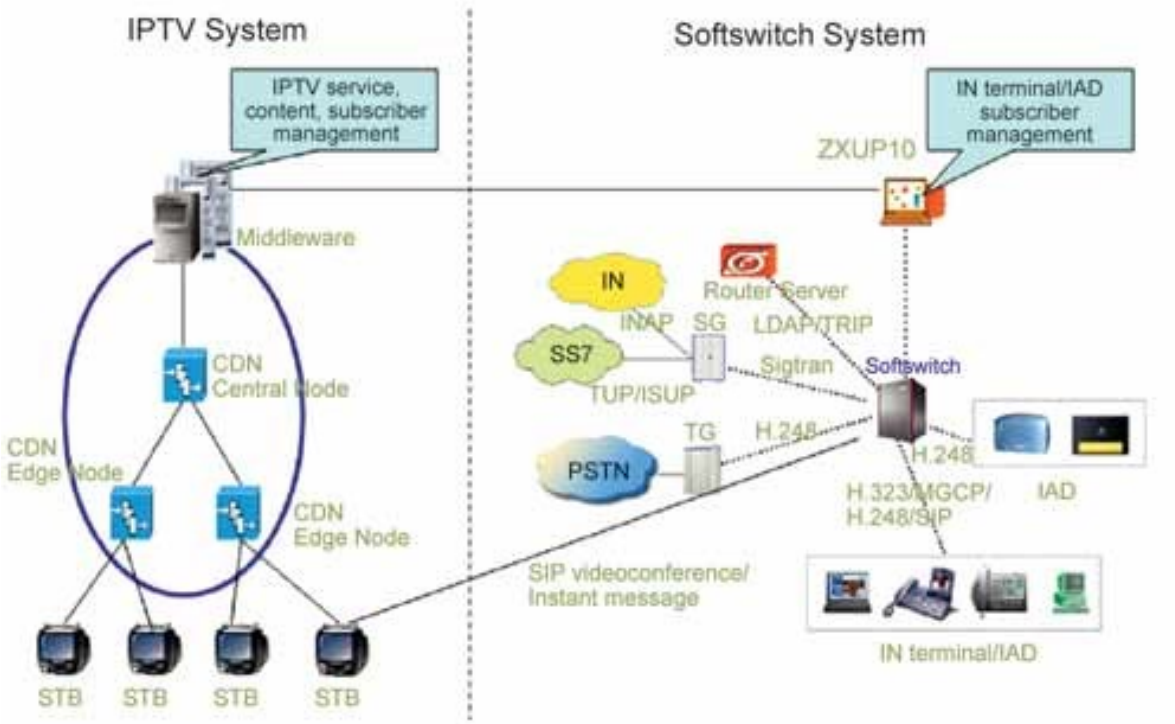
# Communication in Enterprise

- Apply in enterprise communication to improve collaboration between regional areas employers
- Using voice, video and web conferencing riding on a high-performance converged network


*Source: http://huawei.com*

# IPTV deployment in NGN

- The IPTV system has to integrate with Softswitch systems and intelligent network (IN) platforms to realize the video communications as well as other communication services via TV.

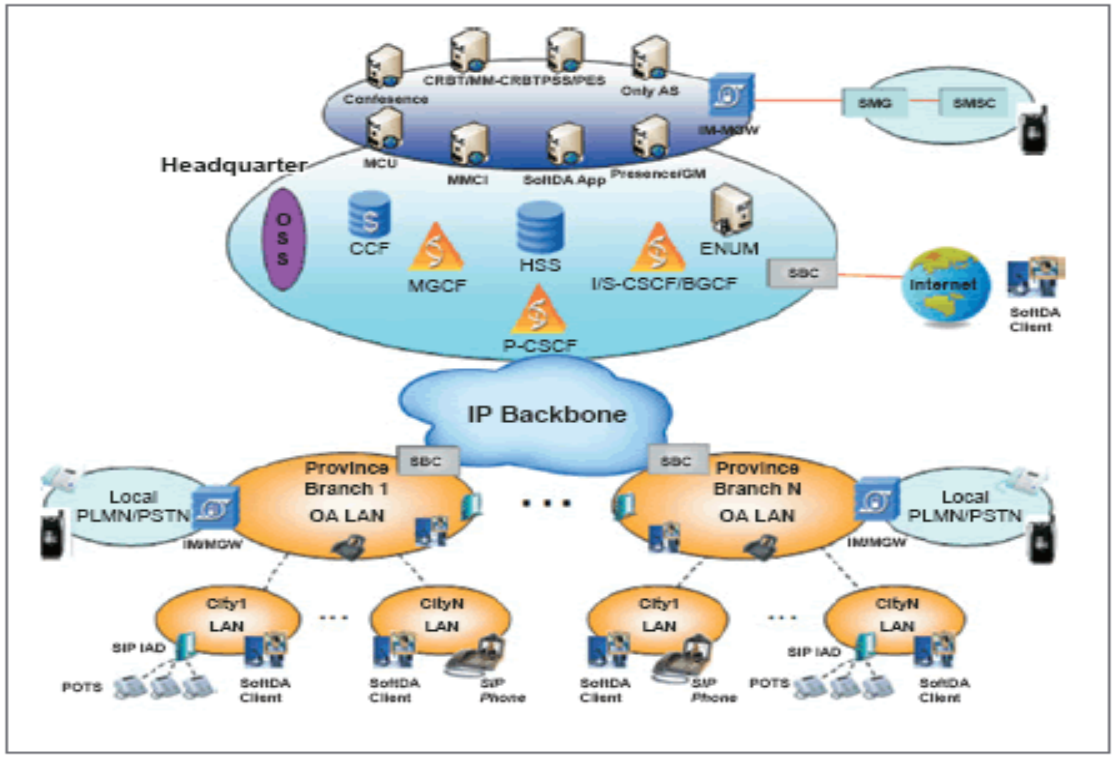



*The NGN architecture for IPTV service*

*Source: http://wwwen.zte.com.cn*

# IMS-Based Multi-network Convergence Solution

- IMS is basically a signaling network based on SIP and Diameter.
- Designed to provide robust multimedia services across roaming boundaries and over diverse access technologies

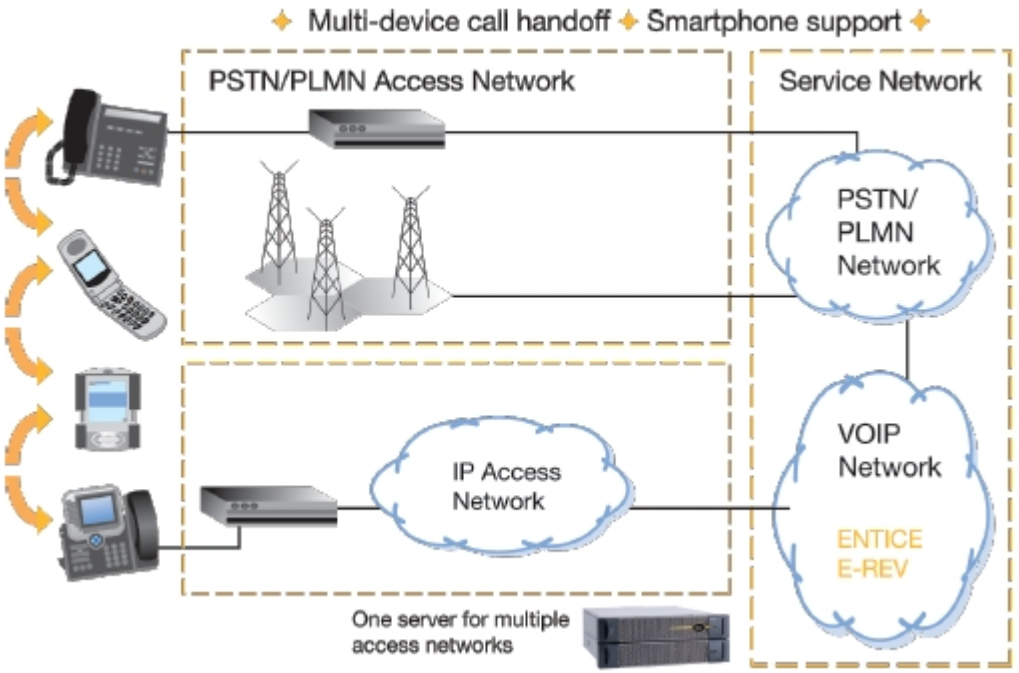



*IMS deployment in China*

*Source: http://wwwen.zte.com.cn*

# Fixed mobile convergence - FMC

- FMC service enables service providers to offer subscribers seamless access to enterprise communications services via any subscriber-selected phone device, whether a mobile handset, IP phone, softphone or traditional PSTN handset



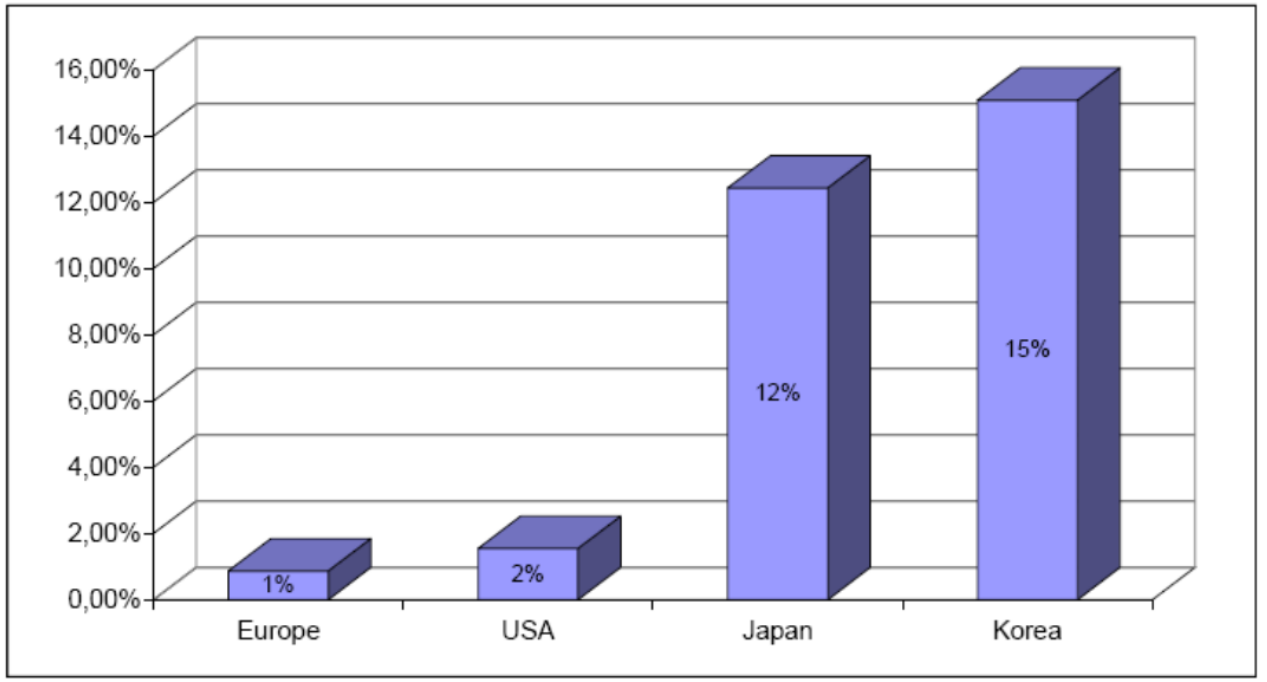

*Fixed Mobile Convergence*

PLMN: Public land mobile network

*Source: http://redlinx.co.za*

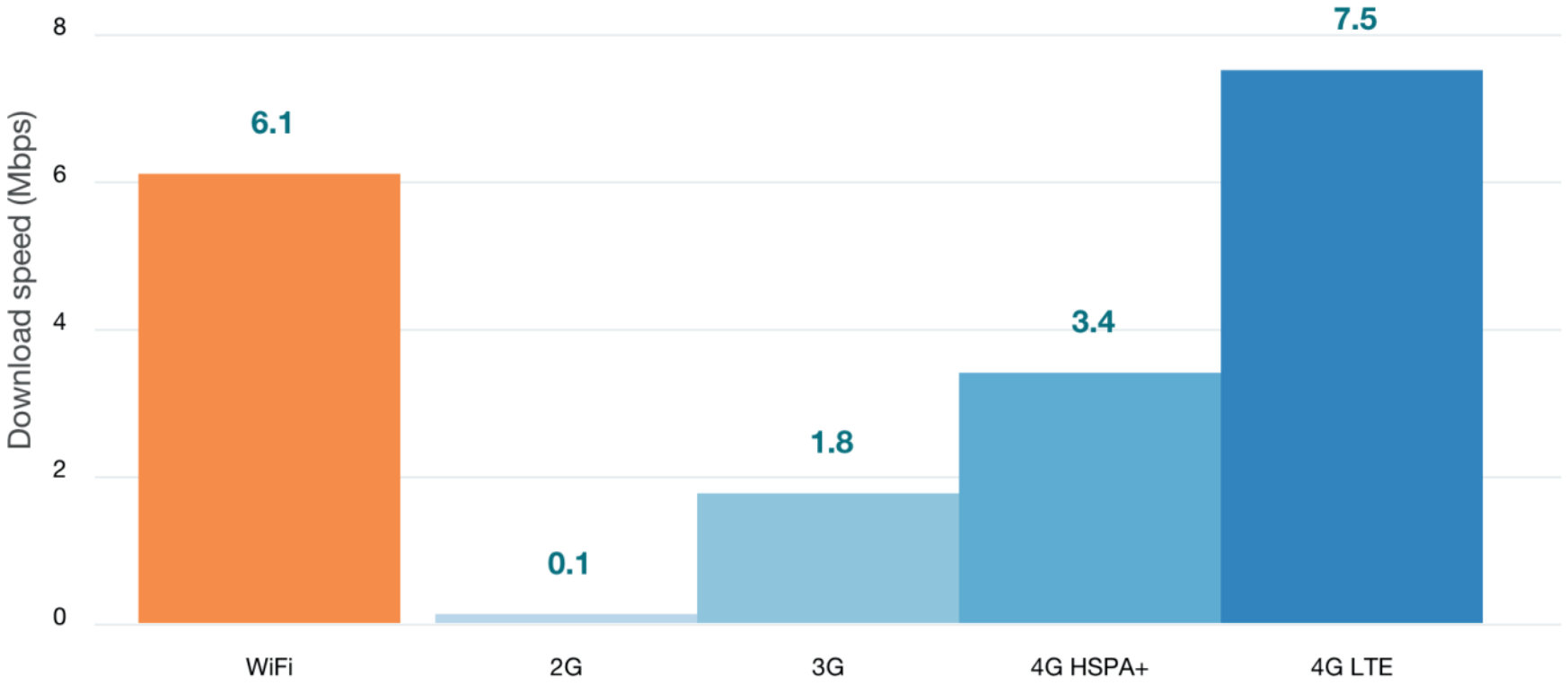
# NGN – Fast and ultrafast Internet access (1)

**Figure 4: Fibre to the Home (FTTH) penetration in July 2009**

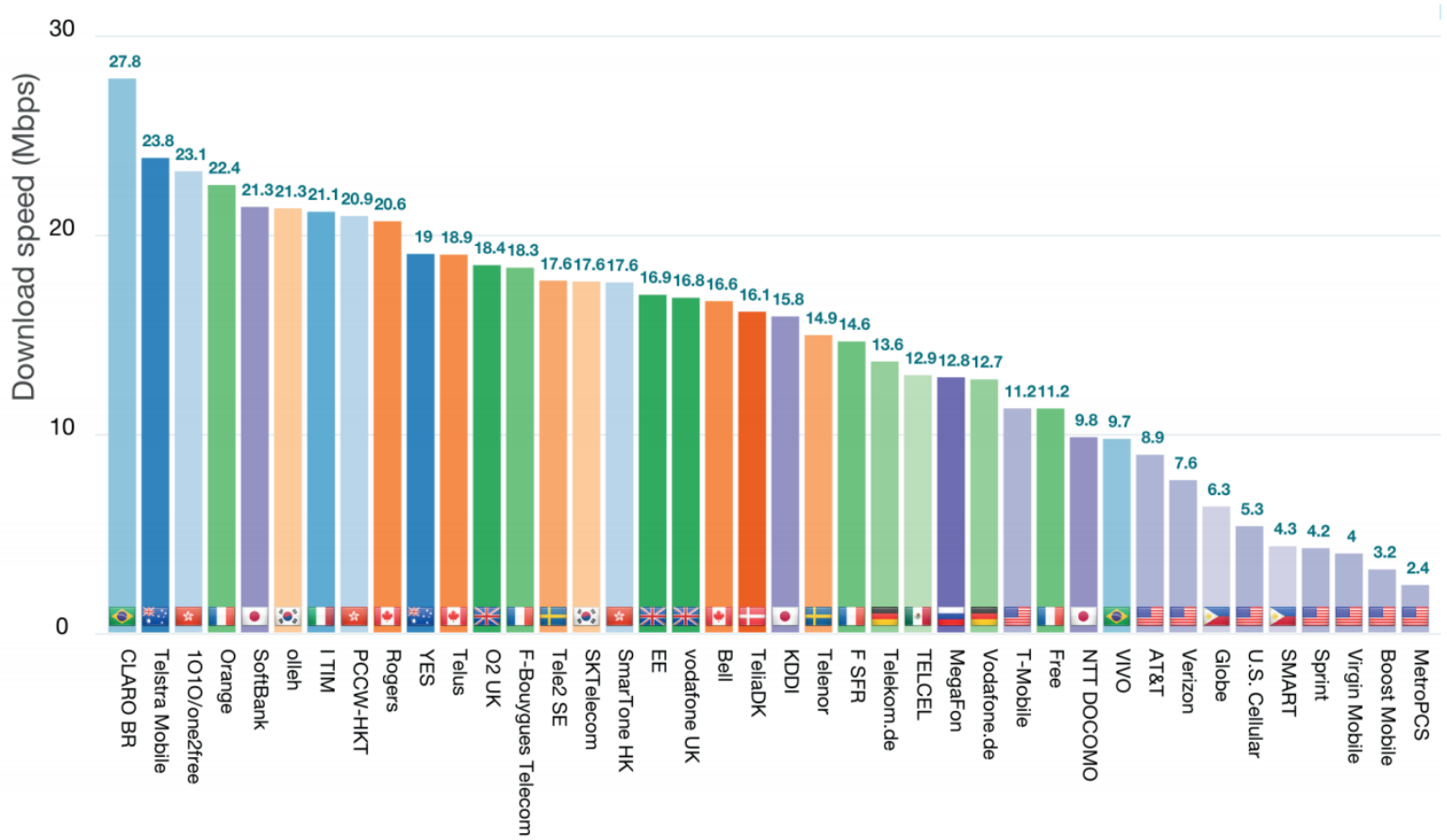



Source: Point Topic

# Fast and ultrafast Internet access (2)

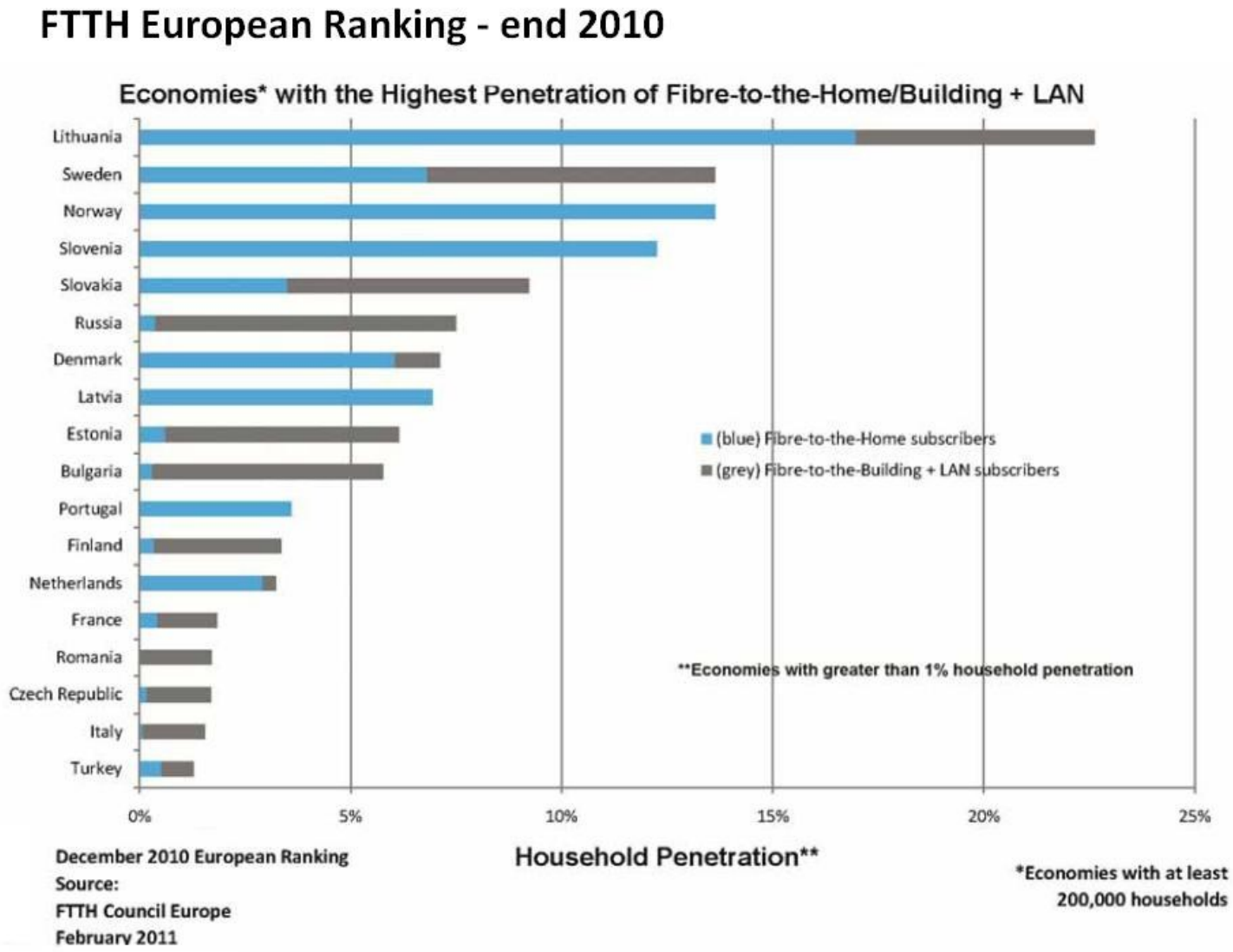


# NGN - Speed compare – Telecom Operators



# NGN in Europe

- **3.9 M of fiber access subscribers** (8.1 M if Russia is included)
- **Baltic countries** (Lithuania, Sweden, Norway, Slovenia, Slovakia) are leading the fiber deployment
- **Portugal** is moving fast in fiber roll out leaving the Netherlands, Finland or France behind
- Some countries with long incumbent tradition does not appear or are in the lower part (Germany, France, Spain, Italy, Portugal, UK)



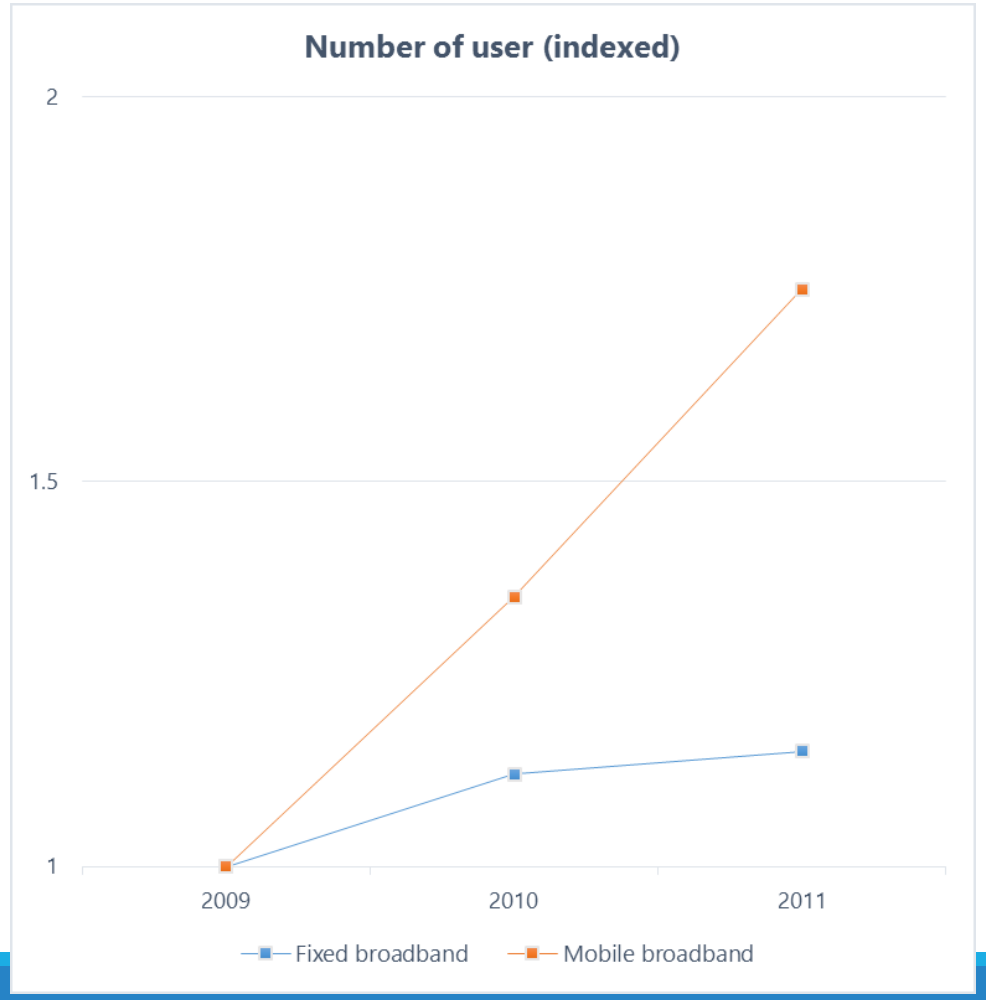
# NGN - LTE Global rollout

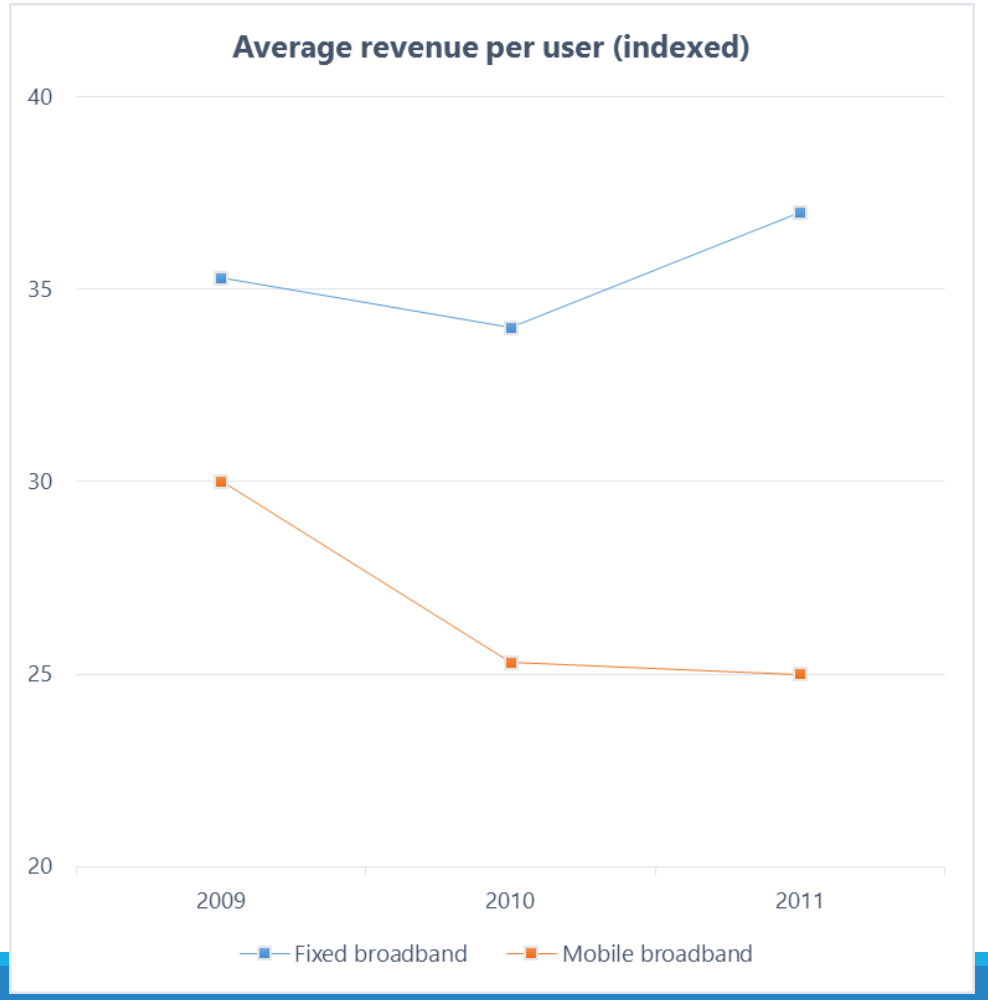

**76**
Countries with LTE

**18**
LTE scheduled

As of February 2014 there are 76 countries with LTE currently active, showing that there is a lot of scope for increase – especially in Africa, which currently lags behind in terms of advanced cellular technologies.

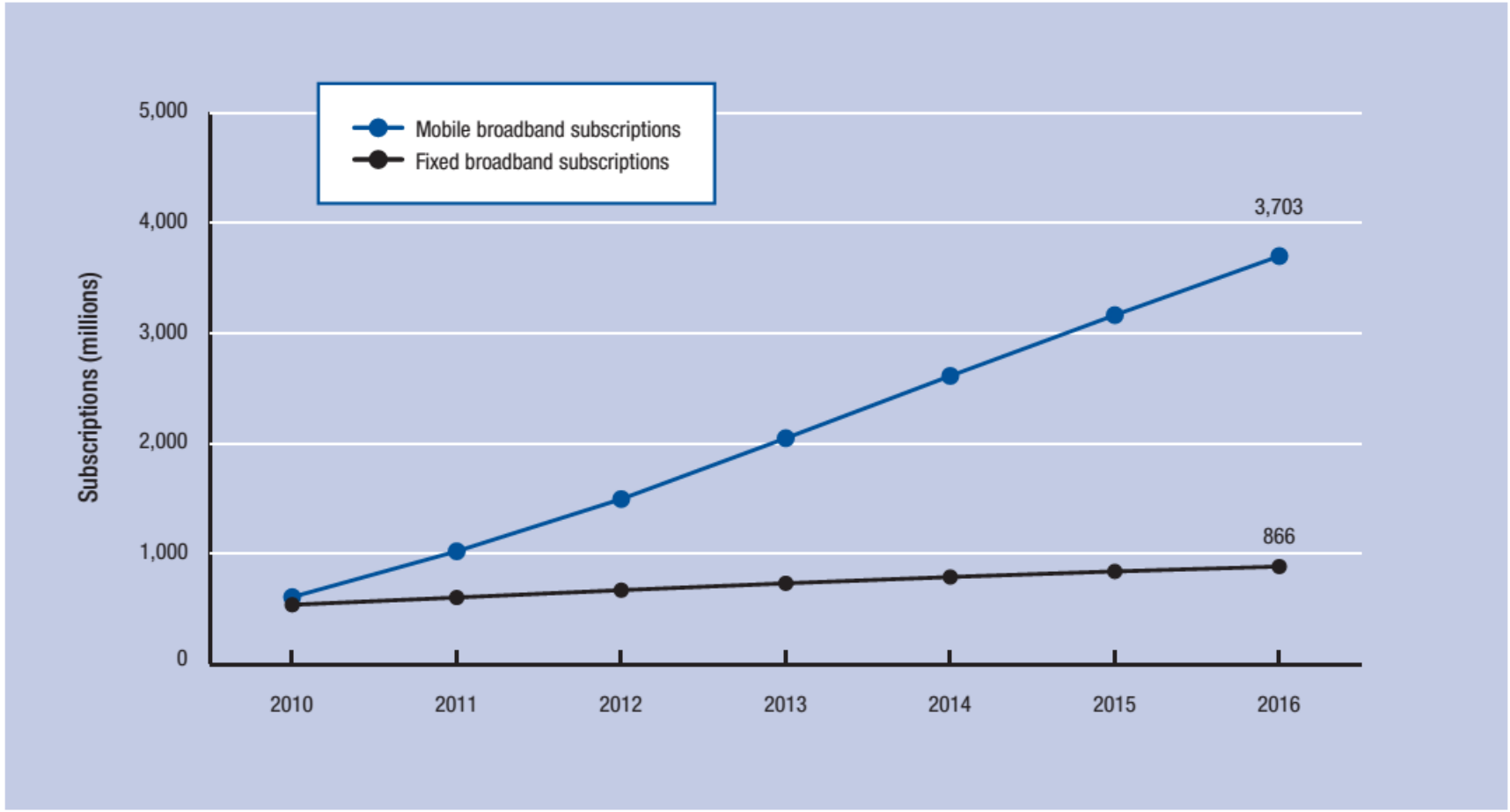
# Fixed-line vs Mobile – Average revenue per user




Source: Global Information Technology report - 2012

# Global broadband subscriptions




Sources: Industry analyst firm forecasts. For mobile broadband subscriptions: HSPA, EV-DO, TD-SCDMA, and LTE subscribers: Wireless Intelligence Database, February 2012; for WiMax: ABI Database, February 2012; for fixed broadband subscriptions: Informa Telecoms & Media (WBIS) Database, February 2012.
Note: Mobile broadband technologies include EV-DO, HSPA, TD-SCDMA, LTE, WiMax, and their respective evolutions.

# Telecom related status in Korea (1)

## Fixed and mobile phone subscriber in Korea

| | | 2014.3 | New subscriber | | 2011.12 | Portion |
|---|---|---|---|---|---|---|
| | | | Variation | Ratio | | |
| **Fixed** | | 17,427,181 | -1,205,320 | -6.5% | 18,632,501 | 24.0% |
| **Mobile** | Feature phone | 16,841,730 | -13,086,655 | -43.7% | 29,928,385 | 23.2% |
| | Smartphone | 38,320,657 | 15,742,249 | 41.1% | 22,578,408 | 52.8% |
| **Total** | | 72,589,568 | | | 71,139,294 | 100% |

# Telecom related status in Korea (2)

## Fixed phone in Telecom Operators

| | 2014.3 | New subscriber | | 2011.12 | Portion |
|---|---|---|---|---|---|
| | | Variation | Ratio | | |
| **KT** | 14,156,694 | -1,543,008 | -9.3% | 15,699,702 | 81.2% |
| **SK Broadband** | 2,758,849 | 280,121 | 10.2% | 2,478,728 | 15.8% |
| **LGU+** | 511,638 | 57,567 | 11.3% | 454,071 | 3.0% |
| **Total** | 17,427,181 | -1,205,320 | -9.3% | 18,632,501 | 100% |

## Smartphone in Telecom Operators

| | 2014.3 | New subscriber | | 2011.12 | Portion |
|---|---|---|---|---|---|
| | | Variation | Ratio | | |
| **SKT** | 26,075,598 | 1,787,500 | 6.9% | 24,288,098 | 50.9% |
| **KT** | 15,176,023 | -1,113,723 | -7.3% | 16,289,746 | 29.6% |
| **LGU+** | 10,014,249 | 1,294,557 | 12.9% | 8,719,692 | 19.5% |
| **Total** | 51,265,870 | 1,968,334 | 3.8% | 49,297,536 | 100.0% |

# Telecom related status in Korea (3)

| | | 2014.3 | Rate | | 2011.12 |
|---|---|---|---|---|---|
| | | | Inc/Dec | % | |
| KT | xDSL | 1,396,672 | **-597,123** | **-42.8%** | 1,993,795 |
| | LAN | 2,824,829 | 105,459 | 3.7% | 2,719,370 |
| | HFC | | 0 | 0.0% | 0 |
| | FTTH | 3,815,025 | 705,865 | 18.5% | 3,109,160 |
| | Satellite | 373 | **-146** | **-39.1%** | 519 |
| SK Broadband | xDSL | 197,541 | **-74,952** | **-37.9%** | 272,493 |
| | LAN | 1,016,831 | **-141,396** | **-13.9%** | 1,158,227 |
| | HFC | 884,988 | **-333,735** | **-37.7%** | 1,218,723 |
| | FTTH | 713,984 | 69,903 | 9.8% | 644,081 |
| | Satellite | | 0 | 0.0% | 0 |
| SKT (Resale) | xDSL | 149,547 | 69,717 | 46.6% | 79,830 |
| | LAN | 785,086 | 419,592 | 53.4% | 365,494 |
| | HFC | 410,901 | 143,192 | 34.8% | 267,709 |
| | FTTH | 473,315 | 287,980 | 60.8% | 185,335 |
| | Satellite | | 0 | 0.0% | 0 |
| LG U+ | xDSL | | 0 | 0.0% | 0 |
| | LAN | 1,757,918 | 103,354 | 5.9% | 1,654,564 |
| | HFC | 939,203 | **-110,512** | **-11.8%** | 1,049,715 |
| | FTTH | 265,845 | 160,434 | 60.3% | 105,411 |
| | Satellite | | 0 | 0.0% | 0 |
| Cable | xDSL | 28,515 | **-49,003** | **-171.8%** | 77,518 |
| | LAN | 614,974 | 263,932 | 42.9% | 351,042 |
| | HFC | 2,450,790 | 21,936 | 0.9% | 2,428,854 |
| | FTTH | | 0 | 0.0% | 0 |
| | Satellite | | 0 | 0.0% | 0 |
| Others | xDSL | 1,734 | **-2,947** | **-170.0%** | 4,681 |
| | LAN | 54,131 | **-51,704** | **-95.5%** | 105,835 |
| | HFC | 38,711 | **-26,998** | **-69.7%** | 65,709 |
| | FTTH | 4,754 | 3,297 | 69.4% | 1,457 |
| | Satellite | | 0 | 0.0% | 0 |

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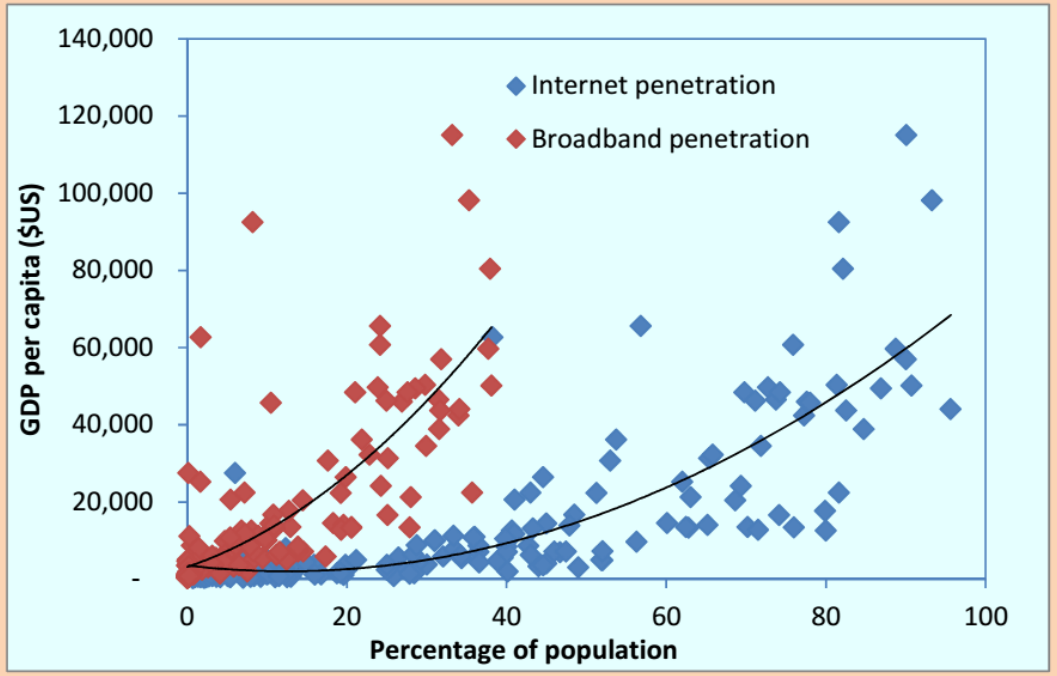
# NGN based services and economic benefits

**NGN technology is deployed by network operators because it is cheaper to buy and can be cheaper to operate.**

The development of NGN services has wider impacts on the overall national economy because broadband Internet access is an enabler for so many other business.

**Figure 3: GDP versus broadband access and GDP versus Internet usage (using any access method)**




*Source: ITU and World Bank data 2010*

# Economic parties of NGN migration issues

**Policy makers:**

- Set framework for developing NGN in their National Broadband Plan.
- Must consider how NGNs are used and impact to other sector: education, e-government, environment, healthcare, etc.

**Regulator authorities:**

- Set the practical framework for developing NGNs to meet the policy agenda.
- Ensure positive outcomes to encourage efficient competition, ensure interworking of systems and prices are set fairly.

**Investors:**

- NGNs require investment.
- A government views for making a return on this investment is different with a private investor on the time required for re-payment and the acceptable risks and rewards.

**The operators and service providers:**

- Implement and manage the networks and services
- Make a profit in order to pay the investors and to continue business and expand

**Consumer:**

- Want the best quality at the lowest possible price.

# Economic aspects of NGN migration issues

**Funding the investment**

- Building fibre to the premises is expensive.
- Wireless requires for the cost rises with the speed of access service and the number of customers
- Core network and service platforms

**Technical**

- Change from legacy technology to NGN needs for skills and training

**Cost performance factors**

**Competition and regulation**

- Encourage investment, innovation and so provide the best outcomes for citizens through competitive supply.

**Demographics**

- Speed performance of fibre is far better than copper, but is this enough to overcome its high investment costs or to counter the benefits of wireless mobility?

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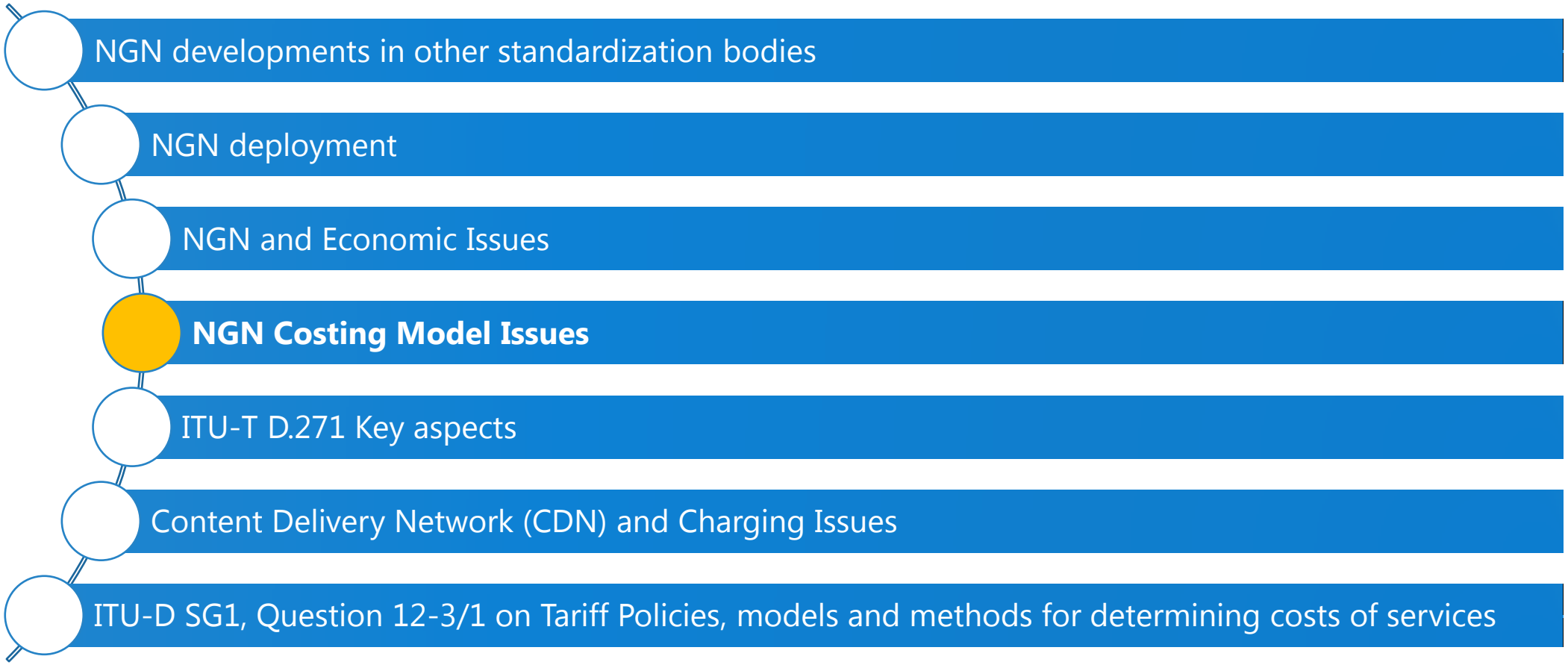
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# Traditional cost modelling

## Separation of access and core networks

- Volume-based traffic costs and fixed access charges

## Scorched node models

- A fixed network architecture with modern equivalent assets

## Core network cost allocation via service routing tables

- Routing tables define network element usage by service
- Cost volume relationships determined for each network element

## Separation of fixed common and joint costs

# NGN cost modelling - Challenges

**Demand**

- Level and patterns uncertain for both new and innovation services and services in decline.

**Busy hour**

- Unknown and changing for data, video, and interactive services
- Delivery of QoS
- Issues associated with net neutrality

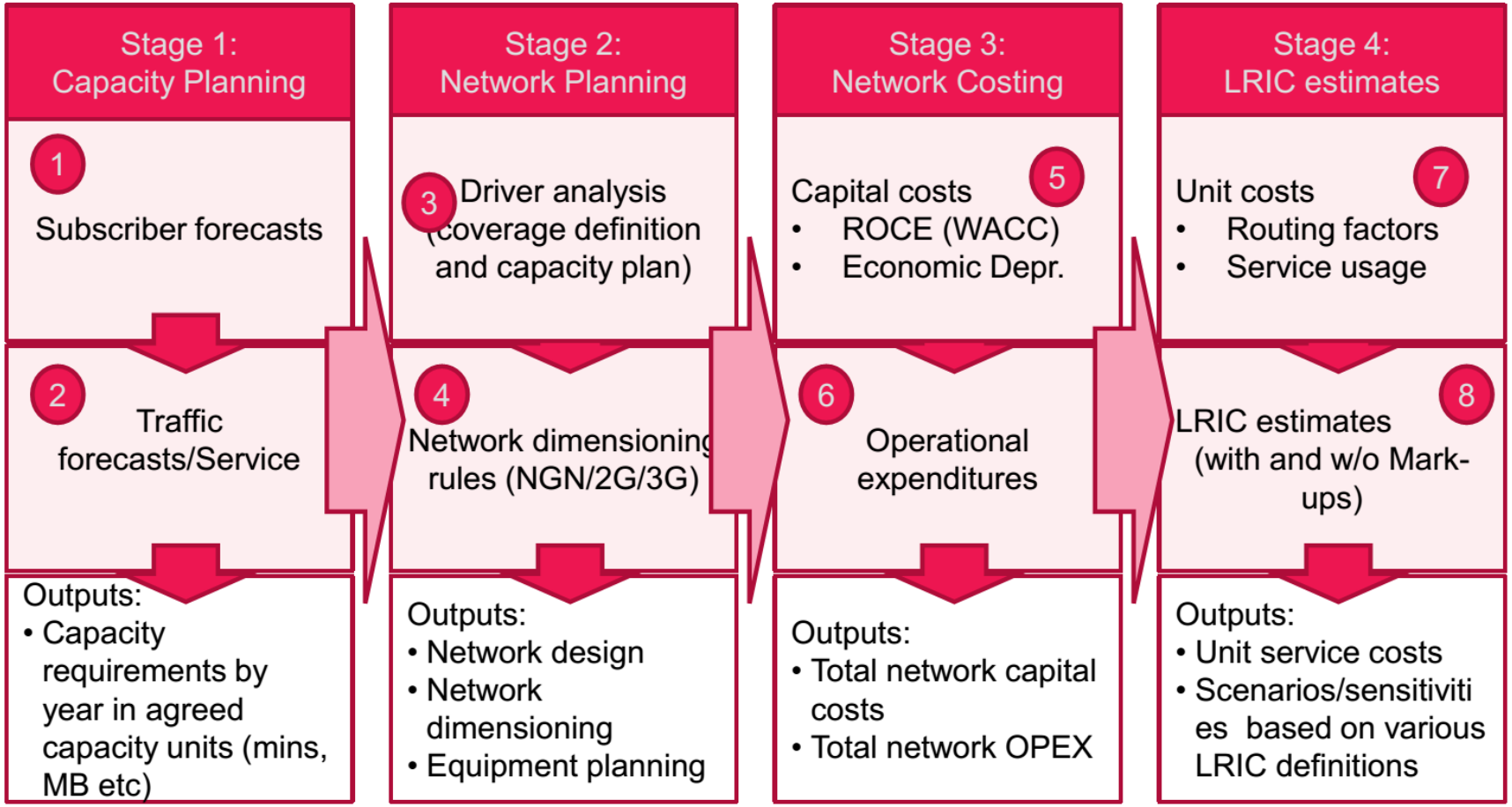
**Change policies for key functions – interconnect** might more like the internet interconnection between peers.

**Routing tables** are determined but likely simple

**Network topology** – Capacity of equipment and equipment relationships

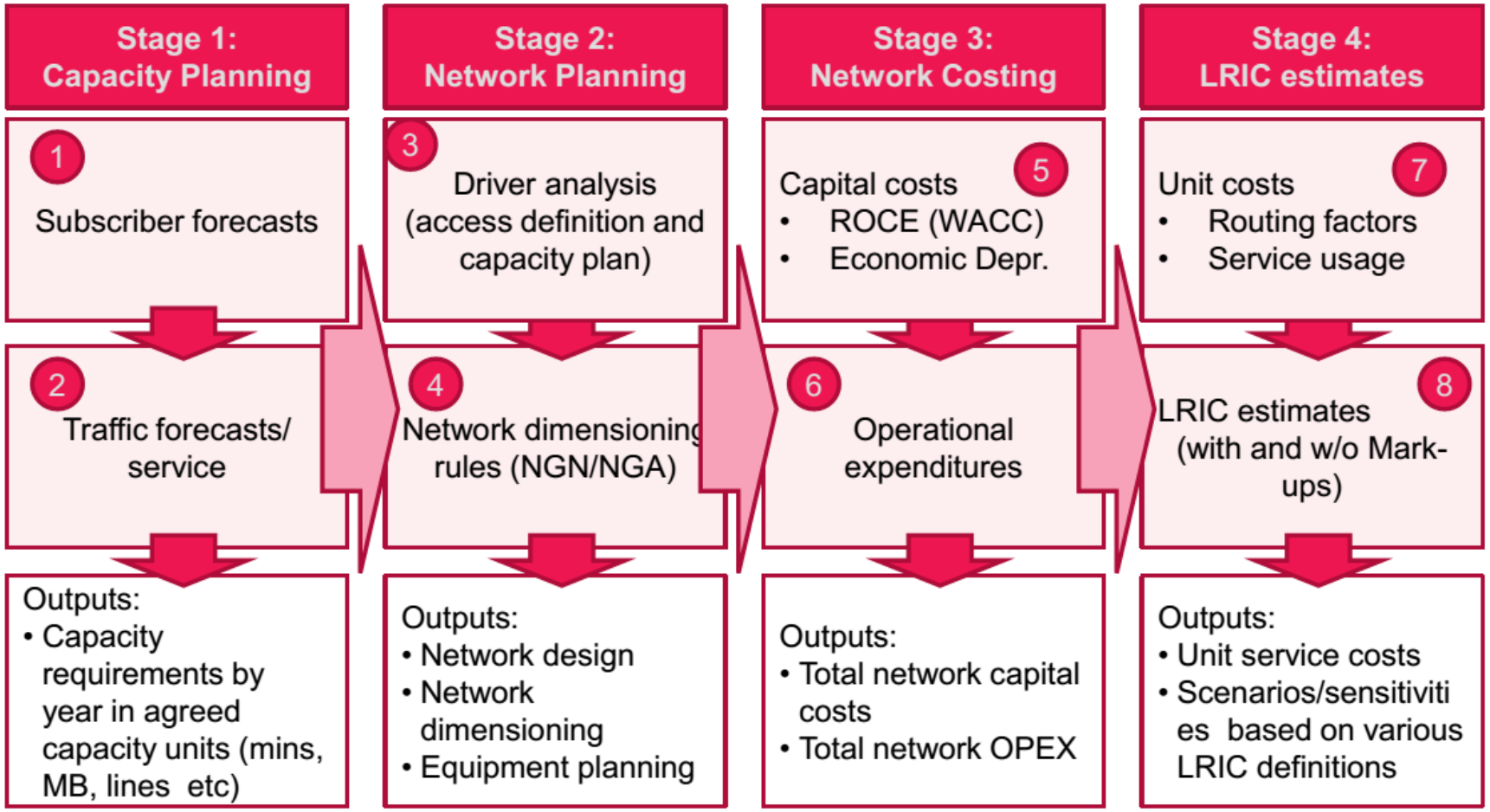
**Asset costs and economic lives** – Emerging and changing

# NGN Cost Modelling – Mobile services




LRIC: Long run incremental cost

# NGN Cost Modelling – Fixed services




LRIC: Long run incremental cost

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# ITU-T D.271 - Charging and Accounting Principles for NGN

**The general principles and conditions applicable by administrations for the capability to transport IP packets over IP-based networks between standards-based interfaces and the services that they support.**

# Concepts for Charging Network utilization

**Charge elements:**

- Session set-up charge element
- Session set-up attempt charge element
- Reservation-based charge element
- Usage-based charge element
- SLA-based charge element

# Charging periods

- An administration may choose to apply different charges to different periods
- The reservation-based charge element relates to the duration of a session. The value of the reservation charge parameter CP_R(.) may differ between charging periods.
- The reservation-based charge element to differ for different charging periods, the duration of the session within each charging period must be known.
  - This information can be derived by comparing the start date and time and the end date and time of the session to the charging periods.
- The usage-based element relates to the packets admitted into the network and packets delivered by the network. The value of the usage charge parameter(s) CP_U(.) may differ between charging periods.
- In order to allow the usage-based charge element to differ for different charging periods, ITU-T Rec. D.271 (04/2008) 5 the number of packets within each charging period must be known.

# Recording interval

CDRs shall be generated immediately on the following occasions:

- at session establishment (indication 0);
- at session release (indication 6);
- during the session's active phase;
- when any of the traffic contract parameters are modified (if relevant signalling is supported);
- at the end of each recording interval (see indications 2, 3, 4, 5).

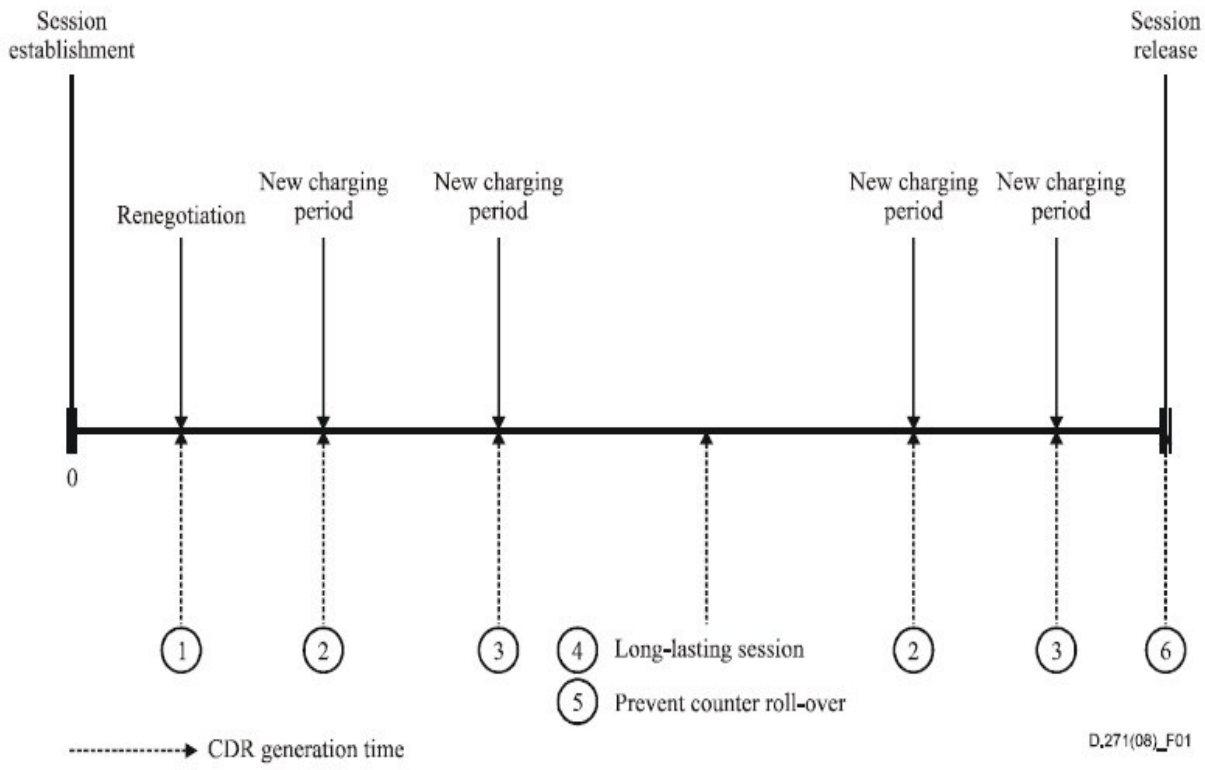


**Figure 1 – Illustration of CDR generating moments**

# Charging end-customers

The charges for services delivered to end-customers normally consist of the following components:

**Network access component**

is intended to cover the cost for providing the access to the service for the customer.

**Network utilization component** charges cover the costs related to the utilization of the network resources.

# Accounting between administrations

## Network access component

- In the case of interconnection, accounting charges are an administration-specific matter.
- Factors that determine the interconnect access charges may be similar to the factors in customer access charges.
- They are subject to agreement between the administrations involved.

# Network utilization component

**Assumptions:** Two assumptions underlie the description of accounting in this clause. Figures 2 and 3 are used in the description of the assumptions.

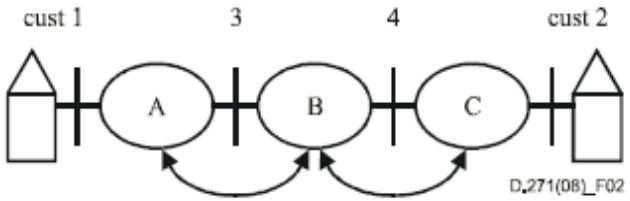


**Figure 2 – Three administrations realize a session through intersession (cascaded organization)**

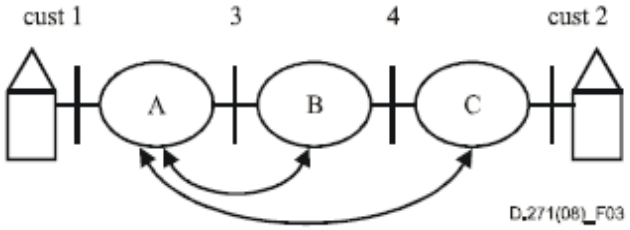


**Figure 3 – Three administrations conduct a session through intersession (star organization)**

# Aggregation within charge elements for accounting

- To reduce the number of parameters stored and used for accounting between administrations, parameters of several sessions may be aggregated and summarized into a smaller set of parameters to which a charge is applied.
- Aggregation takes place over an agreed aggregation period, for example, one month.
- The aggregation of session parameters is described in the following sub clauses for the three charge elements that build the charging options for NGN services:

Aggregation for session set-up charge element

Aggregation for reservation-based charging element

Aggregation for usage-based charging element

# Accounting parameters resulting from aggregation for network utilization

The aggregated parameters collected for accounting at an interface pertain to:

- Session set-up charge element
- Reservation-based charge element
- Usage-based charge element

For the session set-up charging element, the aggregated parameter is the number of session set-ups at that interface, in a given direction.
Different charging periods (time of day) can be applied to the session set-up charging element.

# Accounting parameters resulting from QoS interworking

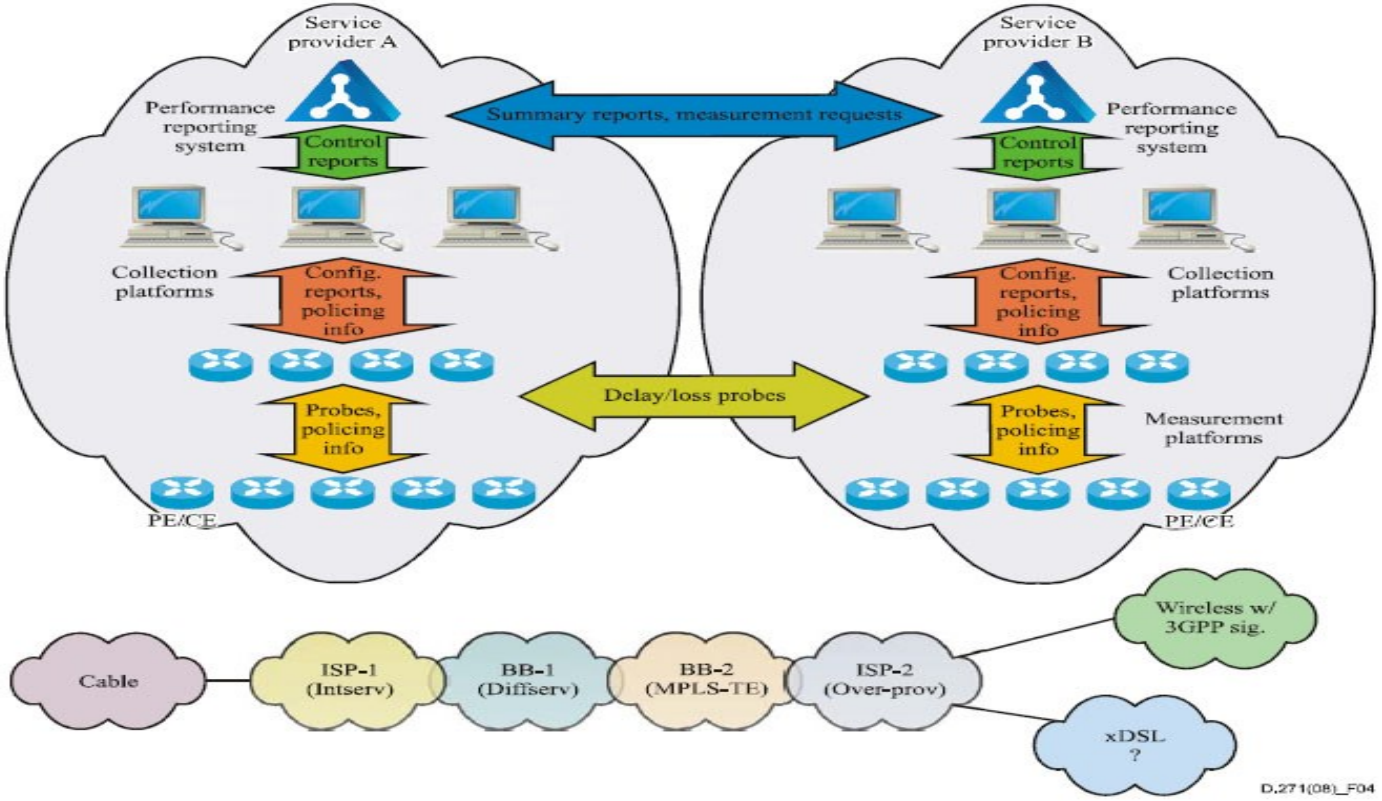


**Figure 4 – QoS interworking accounting parameters**

# Charging parameters

- Charging parameters for DiffServ
- Charging parameters for IntServ
- Charging parameters for SIP-initiated Services
- Charging parameters for FSA Signaling
- Charging parameters for NSIS
- H.323 protocol
- **Content Delivery Network (CDN)**
- RMD DiffServ
- Software Defined Networking (SDN)

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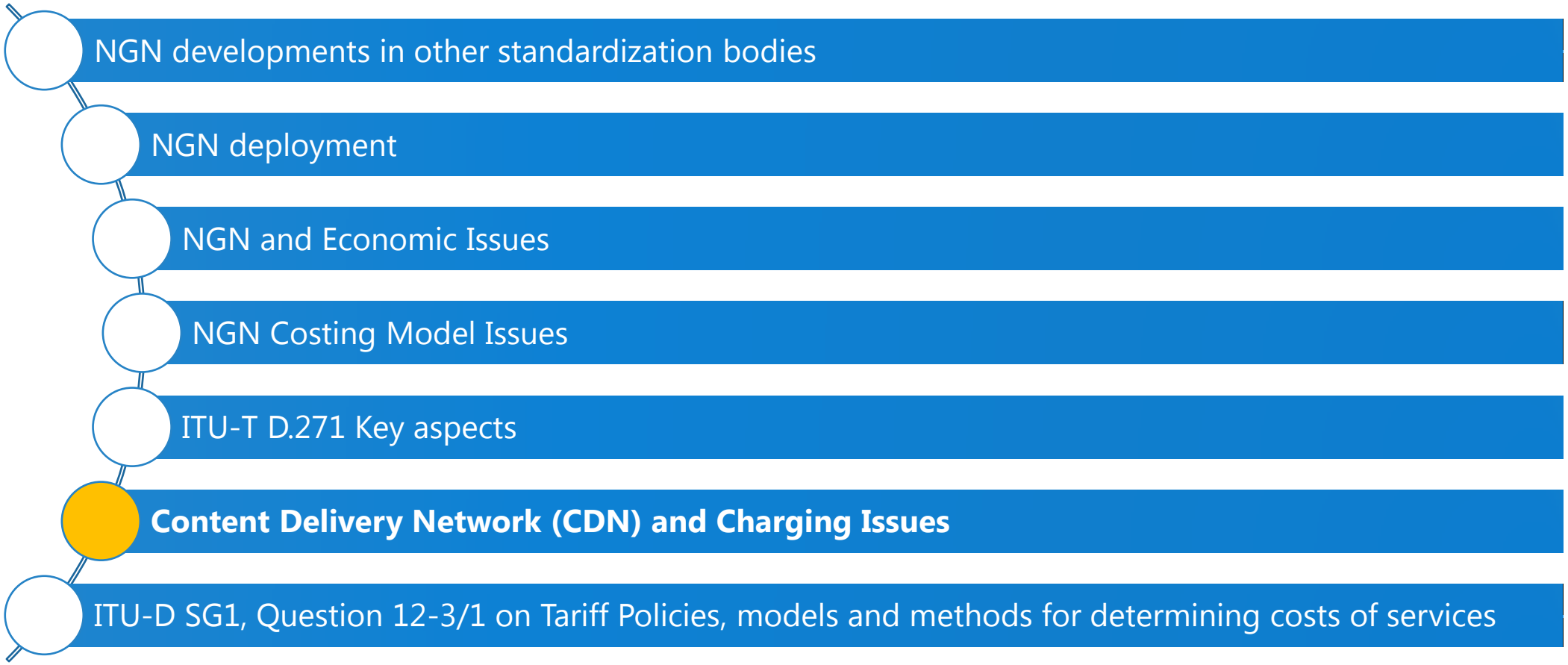
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# What is CDN?

**CDN is a system of computers (computing devices) networked together (across the Internet) that cooperate to deliver content to end users.**

## Goals

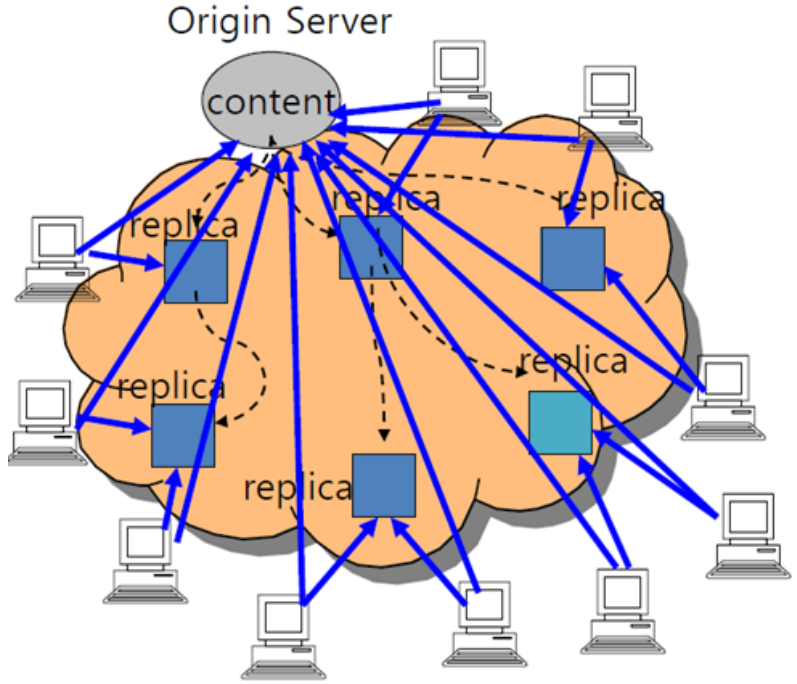
- Load balancing
- Fast response
- High availability
- Handling flash crowd

## Benefits to ISPs

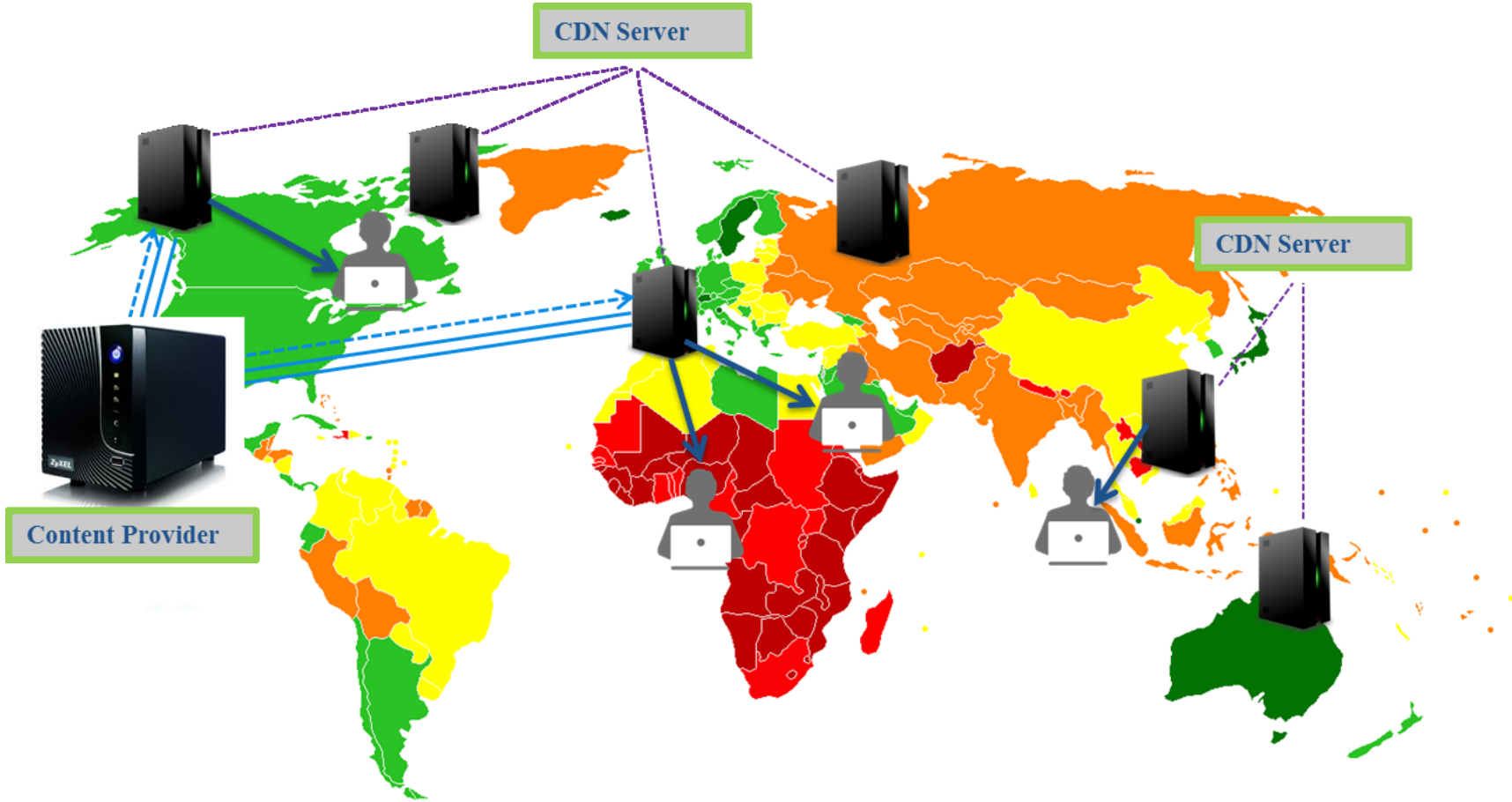
- Efficient usage of internal network resources
- Traffic reduction

## End-user

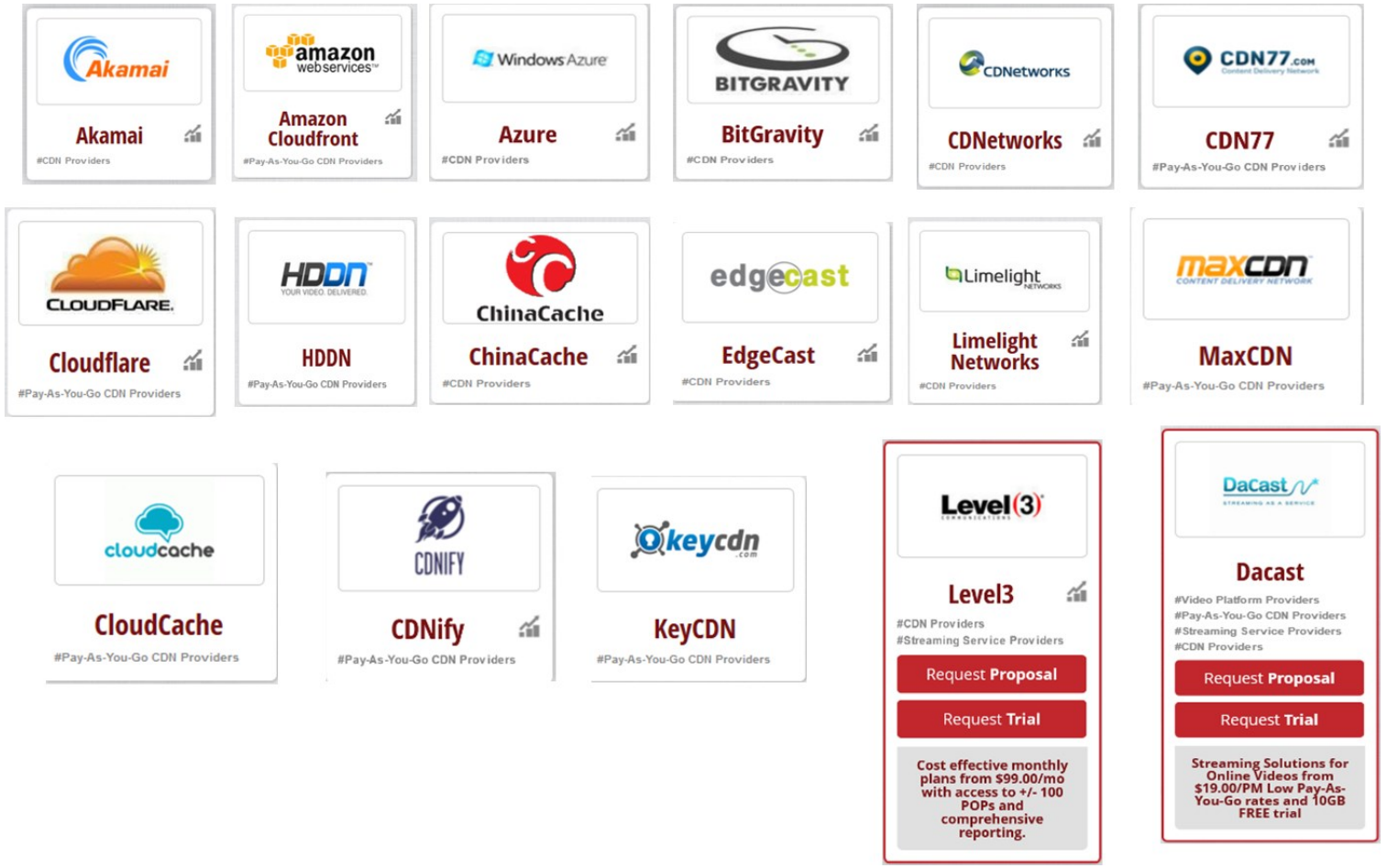
- Better enduser experience
- Content Provider
- Can serve the customer a high quality



# Architecture of CDN

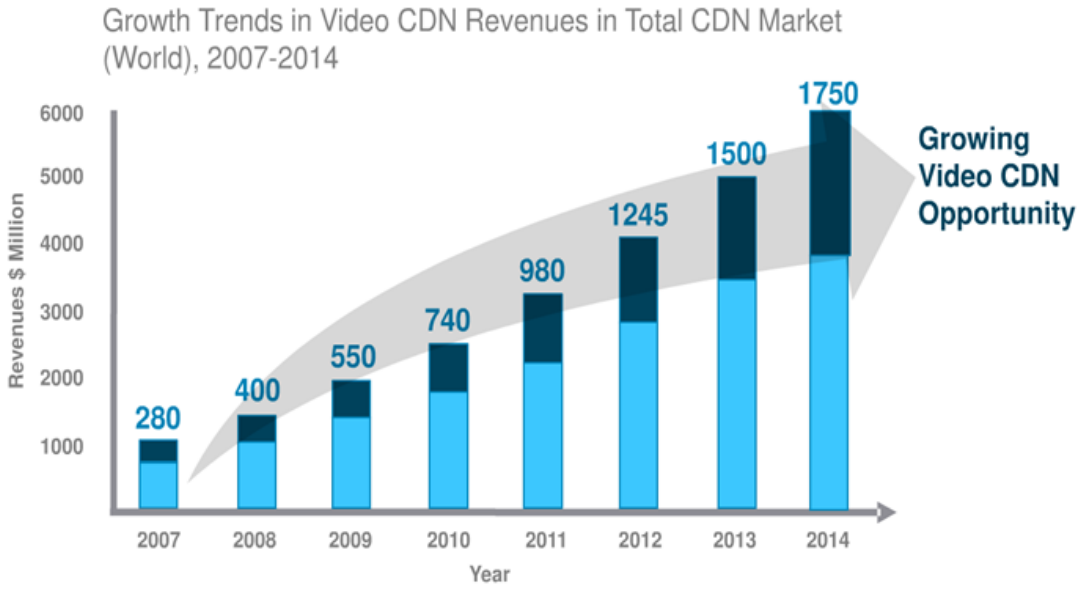


# Global CDN Market (1)



# Global CDN Market (2)

- Leading CDN Providers are as follows
  - Akamai (US based)
  - Limelight Networks (US based)
  - Edgecast, Highwinds
  - ChinaCache, CDNetworks in Asia
- The CDN market represented around $2 billion worldwide in 2009
- It should reach $4 billion by 2012




Source: BT Wholesale, 2010

# Who use CDN solution?

# CDN – Cost of saving

**Multiple thousands of request can be served by sending your content to the CDN platform ONLY ONCE**

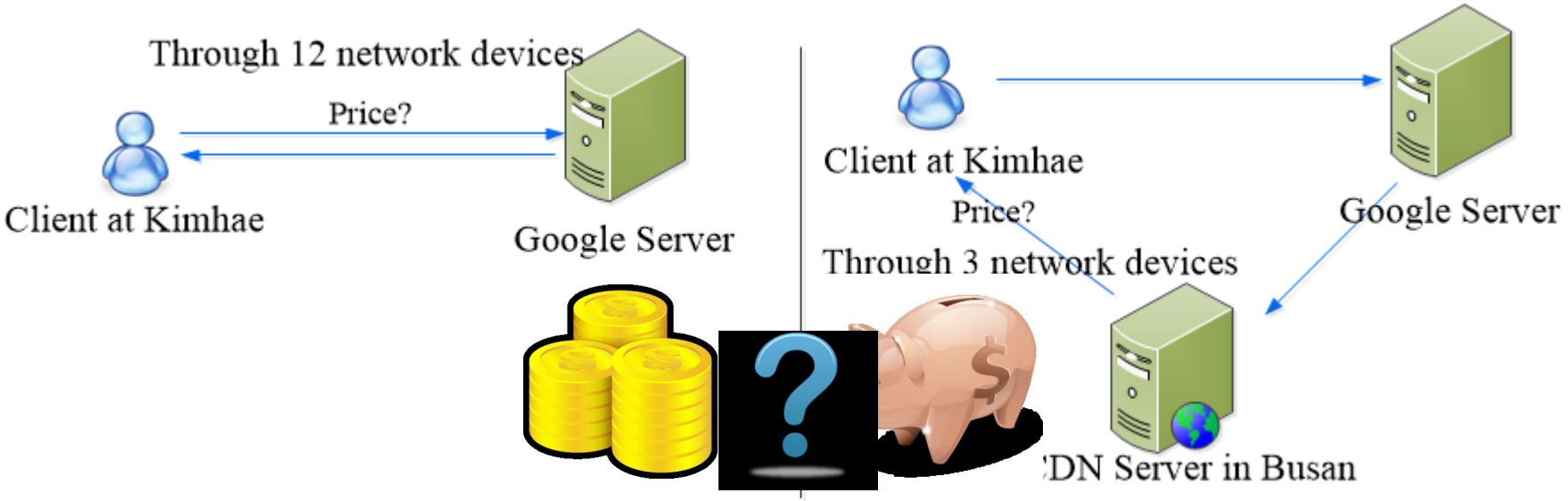
We can SAVE

- Cost of internet access
- Server capacity (hardware)
- Network resource

# CDN Service Prices

- Classify in to
  - Peak Traffic method
  - Traffic Volume method
- Peak Traffic
  - Based on average of the billing
- Traffic Volume
  - Based on amount of usage traffic
- Traffic Volume based Pricing or Content Value based Pricing
- **Differentiated Pricing or Single Pricing?**

# CDN Charging Parameters (1)




**The difference price between 2 models**

How many network equipment **CONTENT** must be through to reach client?

**-> Pricing?**

# CDN Charging Parameters (2)

- Charging parameter based on network access and network utilization
- Charging based on 3 methods:
  - Transit charge (based on packet's size)
  - Content charge (based on content type: news, video, music…)
  - Combination of transit and content charges
- Adding CDN Charging Parameter paragraph to D.271
  - Using CDN services, users get content from nearby cache CDN server, network components is changed.
  - Charging for end-customers will be changed.
  - But content provider increase expense because of using CDN service.
- Consider and update CDN in the relevant NGN architecture for SG13.

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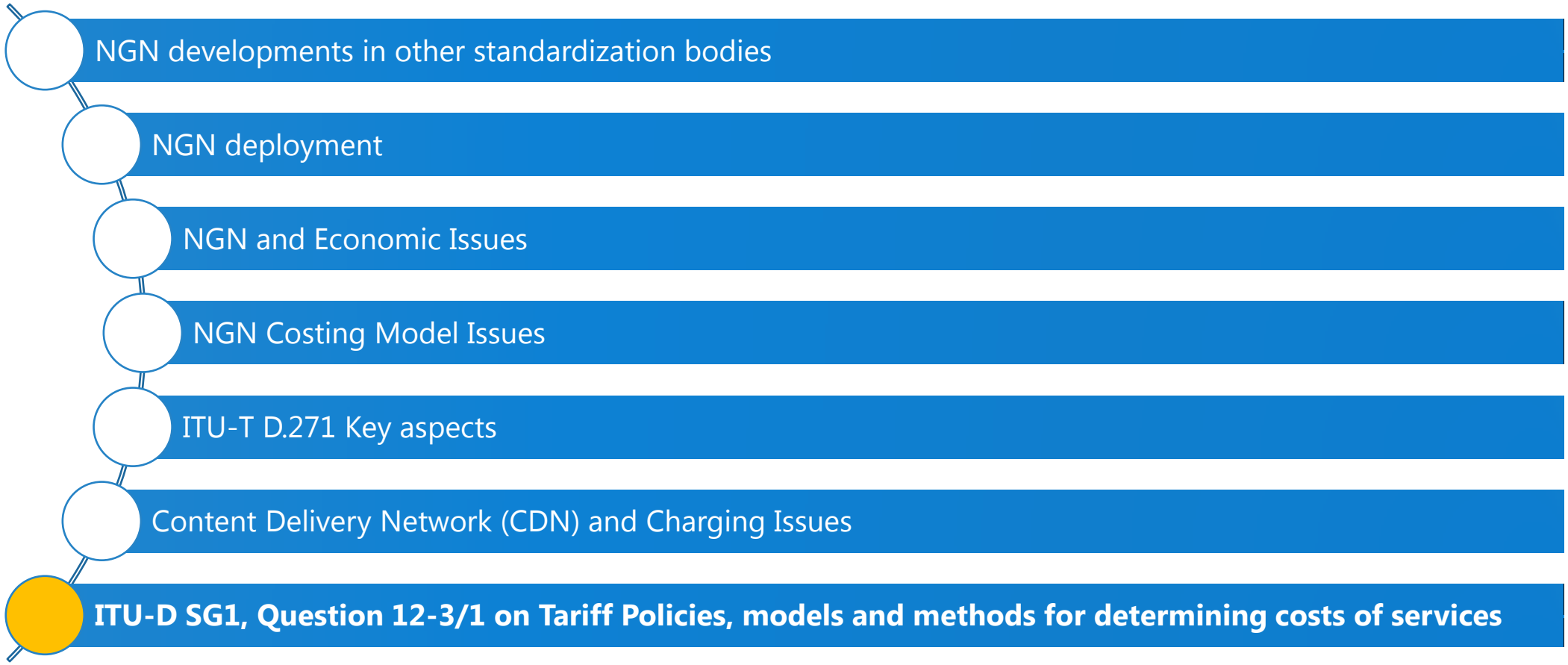
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# Statement of the situation

## NGN networks

- NGN networks do not present the same cost structure as traditional networks.
- The majority of the costs are fixed costs that are independent from usage.
- service offers are based around the cohabitation on one and the same infrastructure of fixed, mobile and high-speed flows.

## Traditional networks

- Costs have virtually nothing to do with distance, and IP tariffs will of necessity have to take account of these characteristics.
- Tariffs focuses on the wholesale prices of each service, with fixed voice, mobile voice and data being handled separately.

# Statement of the situation

Advantages of adopting NGNs in developing countries:

Considerable economic and social advantages

- universal service access for the poorest segments of the population

The low level of data communication in the developing countries can likewise be remedied by

leveraging the potential of NGNs

# Question for study

Effects or benefits of NGN migration for all stakeholders, including consumers.

The cost structure of NGN services compared to that of services provided over traditional networks.

New charging methods for services provided over NGN networks and practical case studies.

Regulating the tariffs for telecommunication/ICT services provided over NGN networks.

Ongoing studies on the economic investment plan models used by countries experienced in

the transition to NGN, in the interests of providing guidance to developing countries.

Ongoing study on the financial and tariff impacts of site sharing for mobile terrestrial

services, broadening the study to embrace all telecommunication infrastructures.

# Expected output

Guidelines for making the transition from existing service offerings in developing countries  to service offerings that combine voice and data, and economic investment plan models used by countries experienced in the transition to NGN, for the purpose of providing guidance to developing countries;

A set of guidelines for promoting growth in data communications in developing countries.

# Thank You !

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