Next Generation Network

SANJIWAN KUMAR

What is NGN

- What is CGN, First?
  - Current Generation Network

Then, what is NGN?

So, What is CGN?

Current Generation Network

- Services - what is telecom ?
  - Voice
  - Data
  - Video

So, What is CGN?

Current Generation Network

- **What is the network platform?**
  - Voice
    - PSTN – Public Switched Telephone Network
    - CMTS – Cellular Mobile Telephone Service

So, What is CGN?

- **DATA**
  - NIB   – National Internet Backbone
  - DataOne
- **Video**
  - Broadcasting Network
  - CaTV Network

NGN is a concept….

So,

Convergence of

service platform

is

NGN
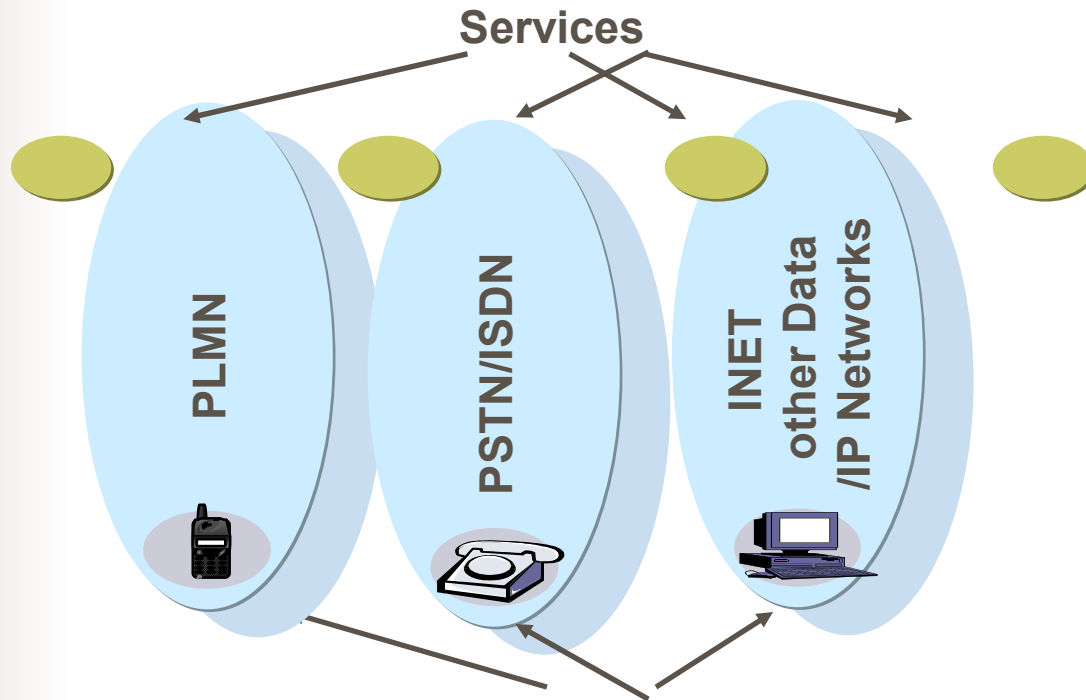
AGENDA

- What is current generation network
- Why Next Generation networks required
- What is NGN
- Basic Terms in NGN

Current Scenario

Today
Separate Service Networks

Services

PLMN

PSTN/ISDN

INET
other Data
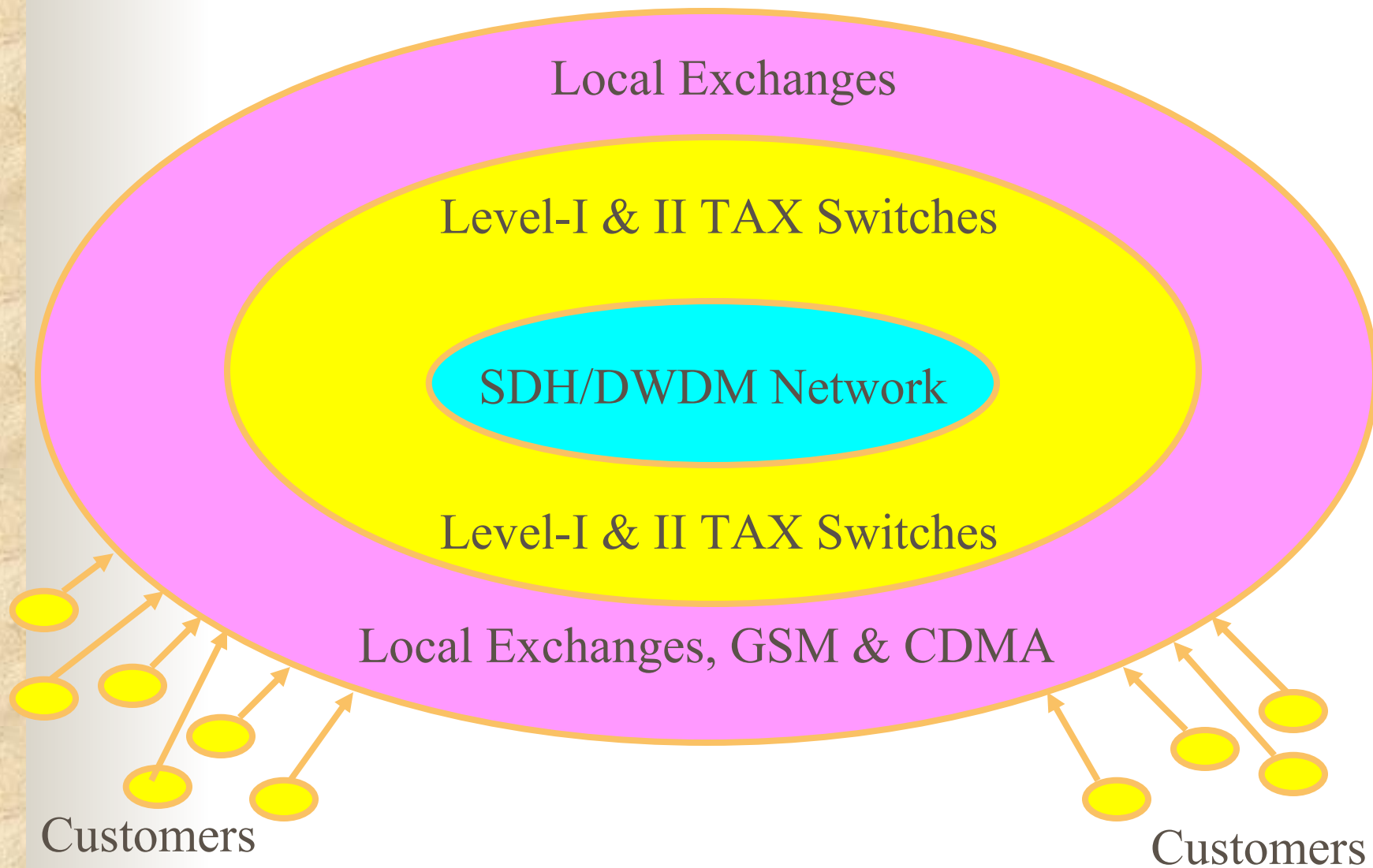/IP Networks

Separate Access Transport & Switching Networks

Current Generation Network(PSTN)

- **Level-I TAXs at 21 locations (LDCAs)**
- **Level-II TAXs at 301 locations (LDCAs). Total No. of LDCCs - 322**
- **Tandem / Transit Switches at Big Cities / SDCC locations (2325 locations)**
- **Total No. of SDCCs 2647**
- **Switches based on the principle of Circuit Switching**

What is Existing Network?

- It has evolved over a period of last 100 years.

- It is mainly optimized for "VOICE" 3 min call and not for data.

- It uses "circuit Switching" which is highly reliable.

Current Generation Network

Local Exchanges

Level-I & II TAX Switches

SDH/DWDM Network

Level-I & II TAX Switches

Local Exchanges, GSM & CDMA

Customers

Customers

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Carrier Grade Voice Telephony

- Reliability – 99.999%. This corresponds to 5 minutes down time per year and is known as five-nines reliability

- Scalability - Capability Support Lakhs of customers.

- Quality of Service :- High speech quality, no perceptible echoes, no noticeable delays, no annoying noises.

MOBILE NETWORK

- Having MSCs, BSCs, BTSs etc
    - About 23000 BTSs
    - About 450 BSCs
    - About 100 MSCs
    - Packet core network consisting of SGSN and GGSN
    - The connectivity with the PSTN only at Lev-I TAX

DATA NETWORK

- Having NIB nodes at circle/SSA/SDCA level
- Connectivity at local exchange level

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- **DRIVERS FOR NGN**

Changing Telecoms Trends

- **Fixed line** usage is reducing dramatically for "classical" services

- **Mobile use** is increasing steadily even though penetration is already high.

- **Broadband Internet** deployment shows a rapid growth trend.

   As per a statistical result IP traffic increases 10 fold every year while voice traffic is relatively flat.

Mobile

Fixed

Broadband
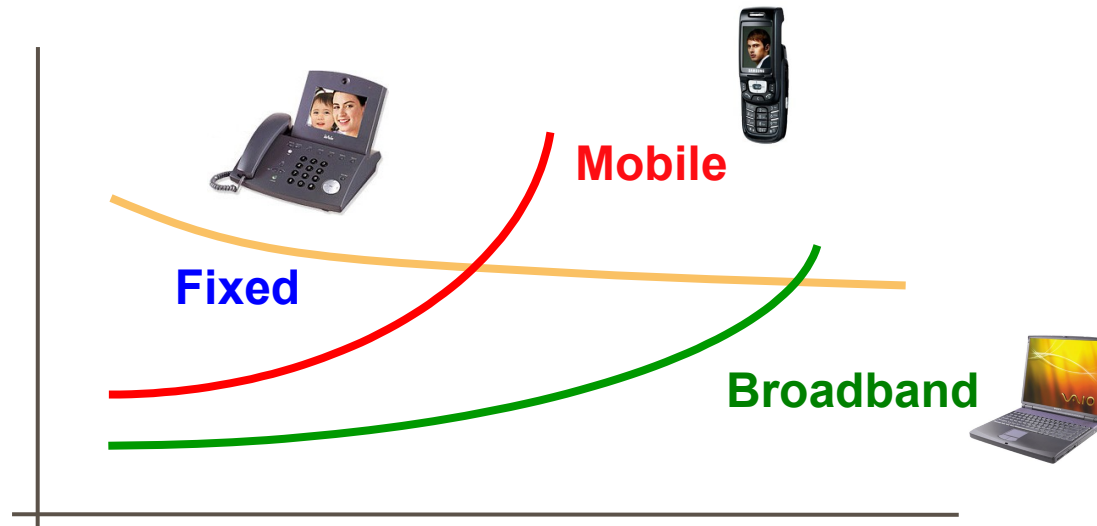
Problems of Existing network

- Slow to develop new features and capabilities.
- Expensive upgrades and operating expenses.
- Proprietary vendor troubles
- Large power and cooling requirements.
- Limited migration strategy to New tech.
- Product/model obsolescence.

Operators Want

MORE CUSTOMERS	REDUCED COST	NEW SERVICES
INCREASED REVENUE	HARMONIZED NETWORKS	FAST TO MARKET

Vendors Want

MORE CUSTOMERS

INCREASED REVENUE

REDUCED COST

HARMONIZED EQUIPMENT

NEW PRODUCTS

BRAND RECOGNITION

Customers Want

New Services

VALUE FOR MONEY or at LESS COST

PERSONALIZATION

SIMPLICITY

MOBILITY

FREEDOM

AND MOST IMPORTANTLY

A CUSTOMER WANTS

ONE BILL

BILLS

- In other words CONVERGENCE is the need of the hour.
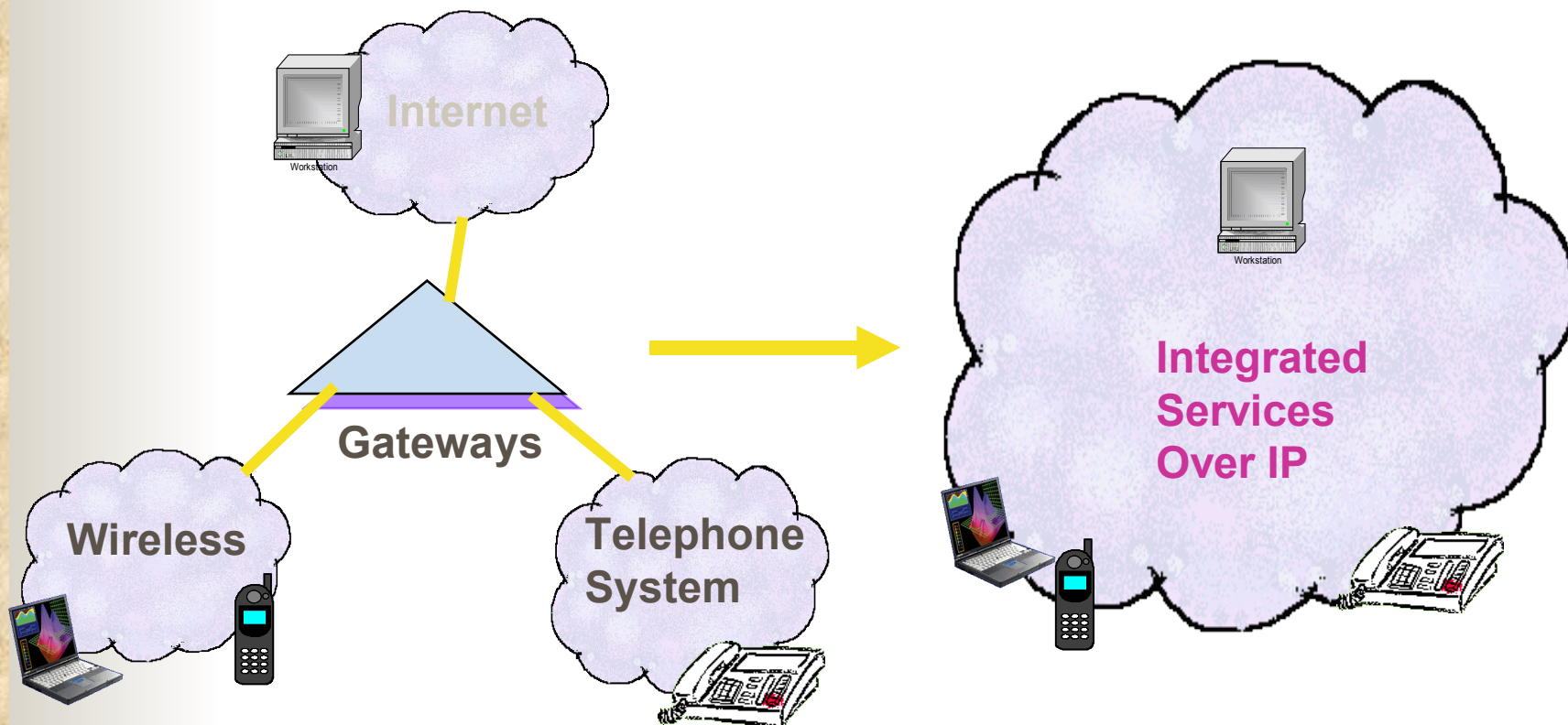
What is NGN?

- This Convergence gives birth to
  ## NGN
  ## OR
  ## NEXT GENERATION NETWORKS
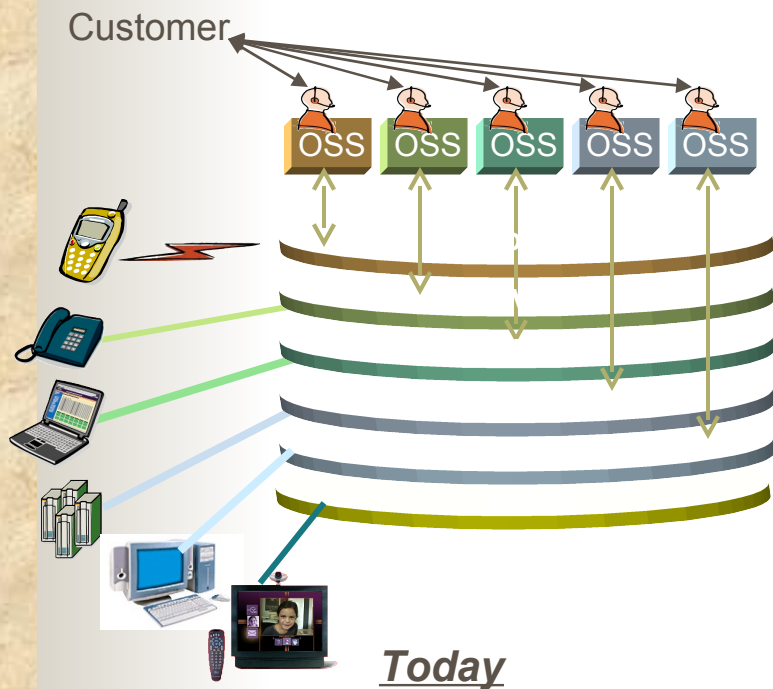
Next generation networks

Present Day Networks
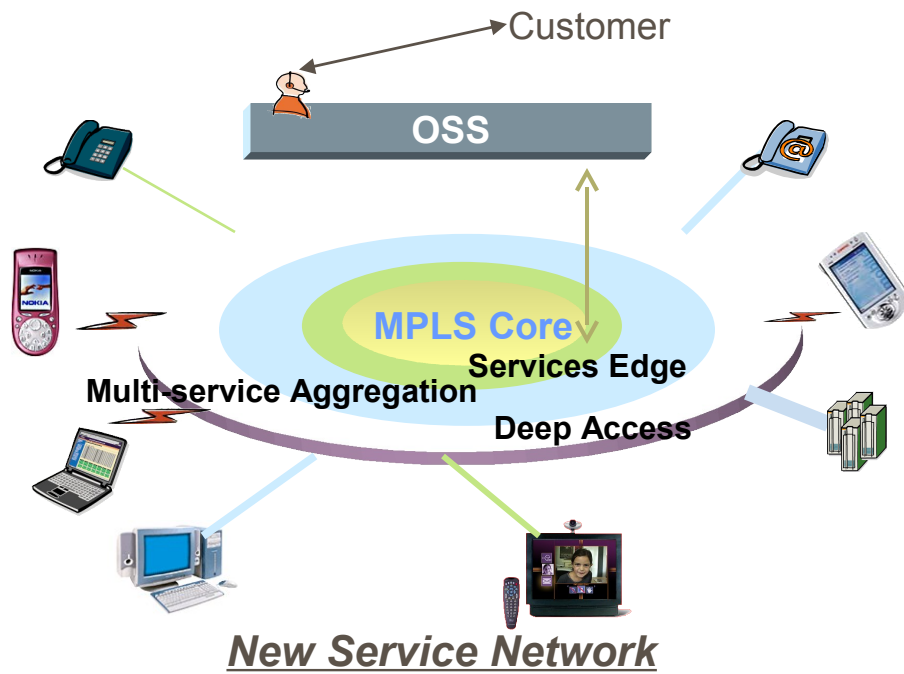
Next Generation Networks (NGN)

Internet

Gateways

Wireless

Telephone System

Integrated Services Over IP

Evolving towards IP Communications

NGN Concept

Today

New Service Network

- Each service has its own network
  - Multiplied operational costs
- Each network managed separately
  - No service interaction
- Multiple customer profiles

Migrate

- Seamless service linkage
  - All services over any access
- One network for any service
  - Unified management structure
- **Single customer profile**

NGN :Definition (As per ITU)

- NGN is a **packet based network** which is able to provide multimedia telecom services and able to make use of multiple broadband, QoS enabled transport technologies in which service related functions are independent from underlying transport related technologies.

NGN :Definition (As per ETSI)

- NGN is a concept for defining and deploying networks, which due to their formal separation into **different layers** and planes and use of **open interfaces**, offers service providers and operators a platform which can evolve in a step-by-step manner to create, deploy and manage innovative services.

NGN: Definition

- NGN is a collection of technologies which shall provide convergence for voice, data and video services. Voice shall also be transported through packet switching.

- NGN is a framework of services for next 4-5 years which shall use packet switching as the core transport and shall be access agnostic i.e. all types of access like fixed , wireless, IP, CDMA, GSM all can be used.
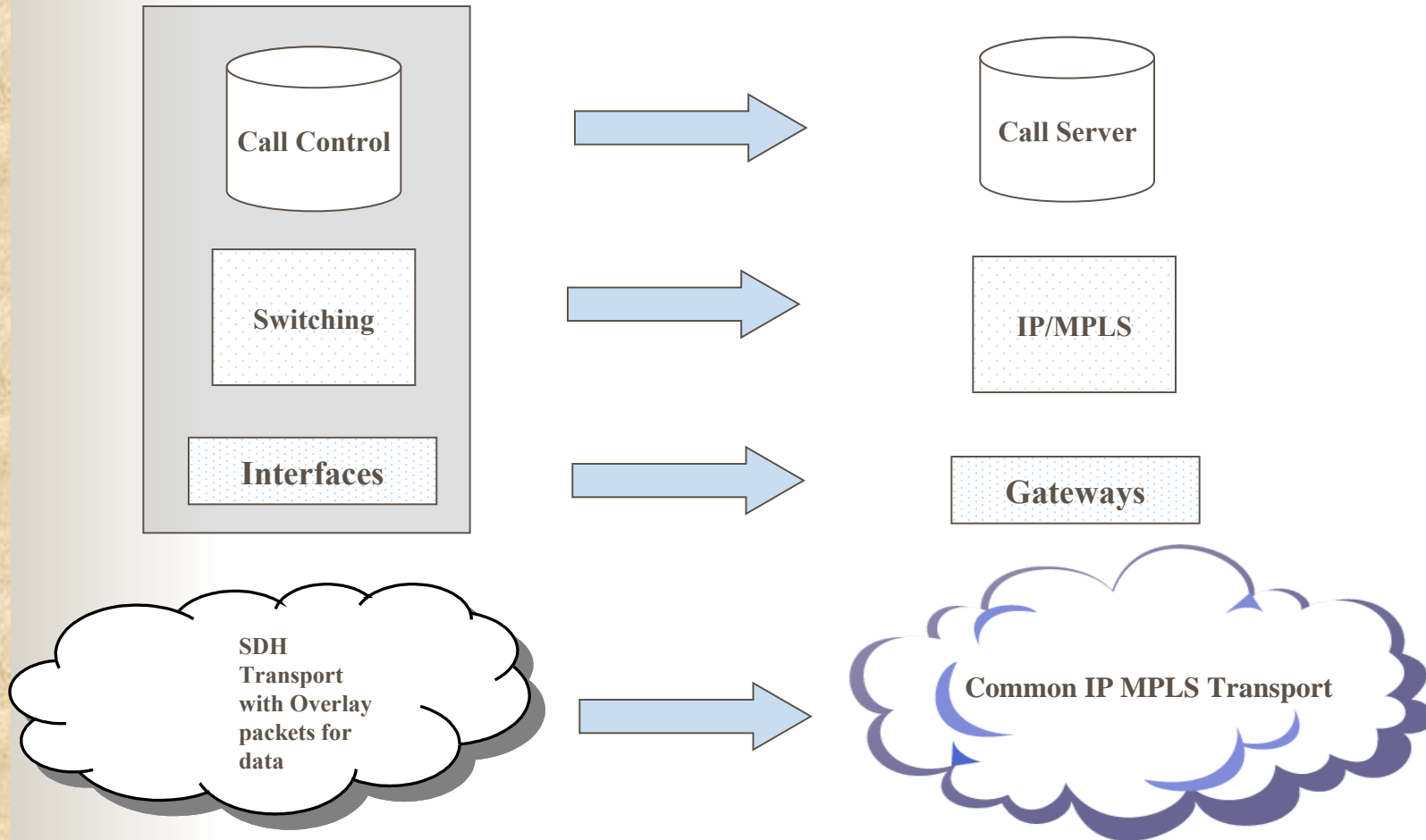
- NGN is a collection of new technologies which allows service providers a great flexibility to offer a variety of new services **"Cost effectively"**

- In NGN basically the switching and call intelligence functions are separated.

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NGN Concept w.r.t. Voice Services
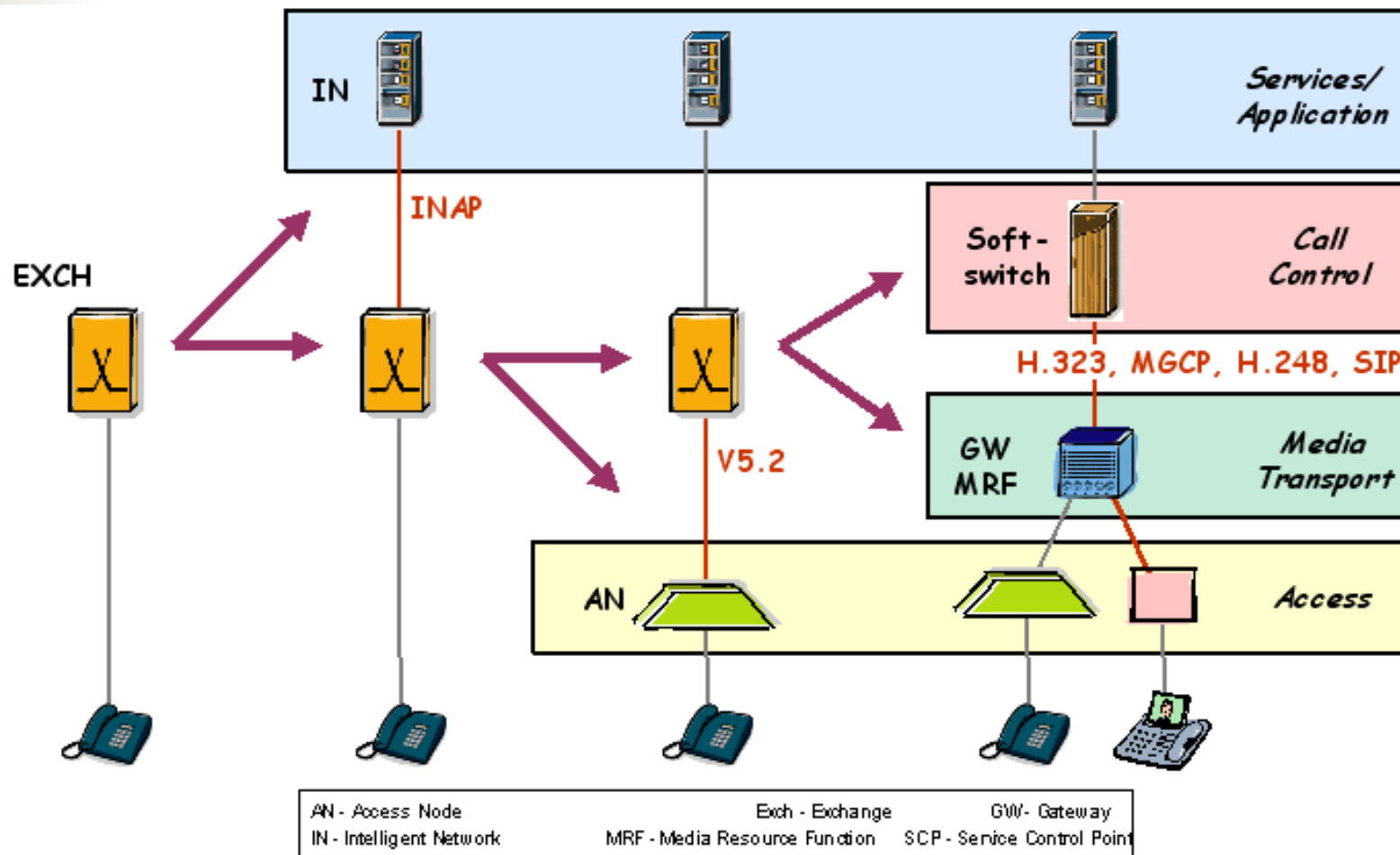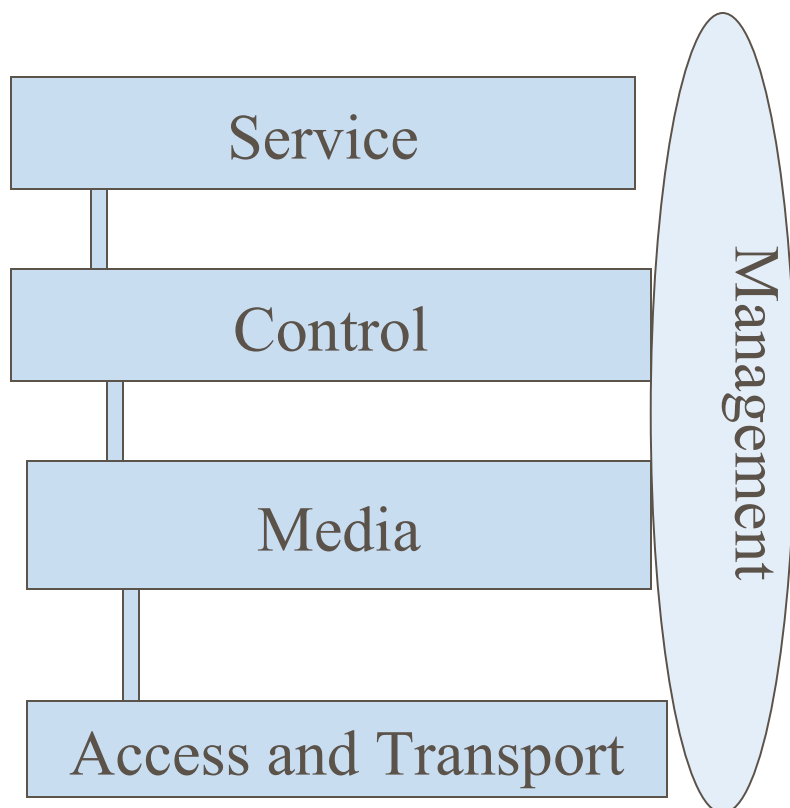
Central Office Switch

NGN Components

Call Control → Call Server

Switching → IP/MPLS

Interfaces → Gateways

SDH Transport with Overlay packets for data → Common IP MPLS Transport

> Separation of layers

NGN Architecture

■

- Access Layer: Combines all the access technologies like POTS, ISDN, GSM/UMTS, HFC, LMDS, ADSL etc.

- Transport Layer: The backbone network and the techniques for transport.It is IP backbone.

- Media Layer: used to adapt the data originating from various technologies to the backbone networks. The equipment is called Media Gateways (MGW)

- Control Layer: This layer controls call handling. It comprises of the equipment that manages signaling (SGW) and call handling (Media Gateway Controller).
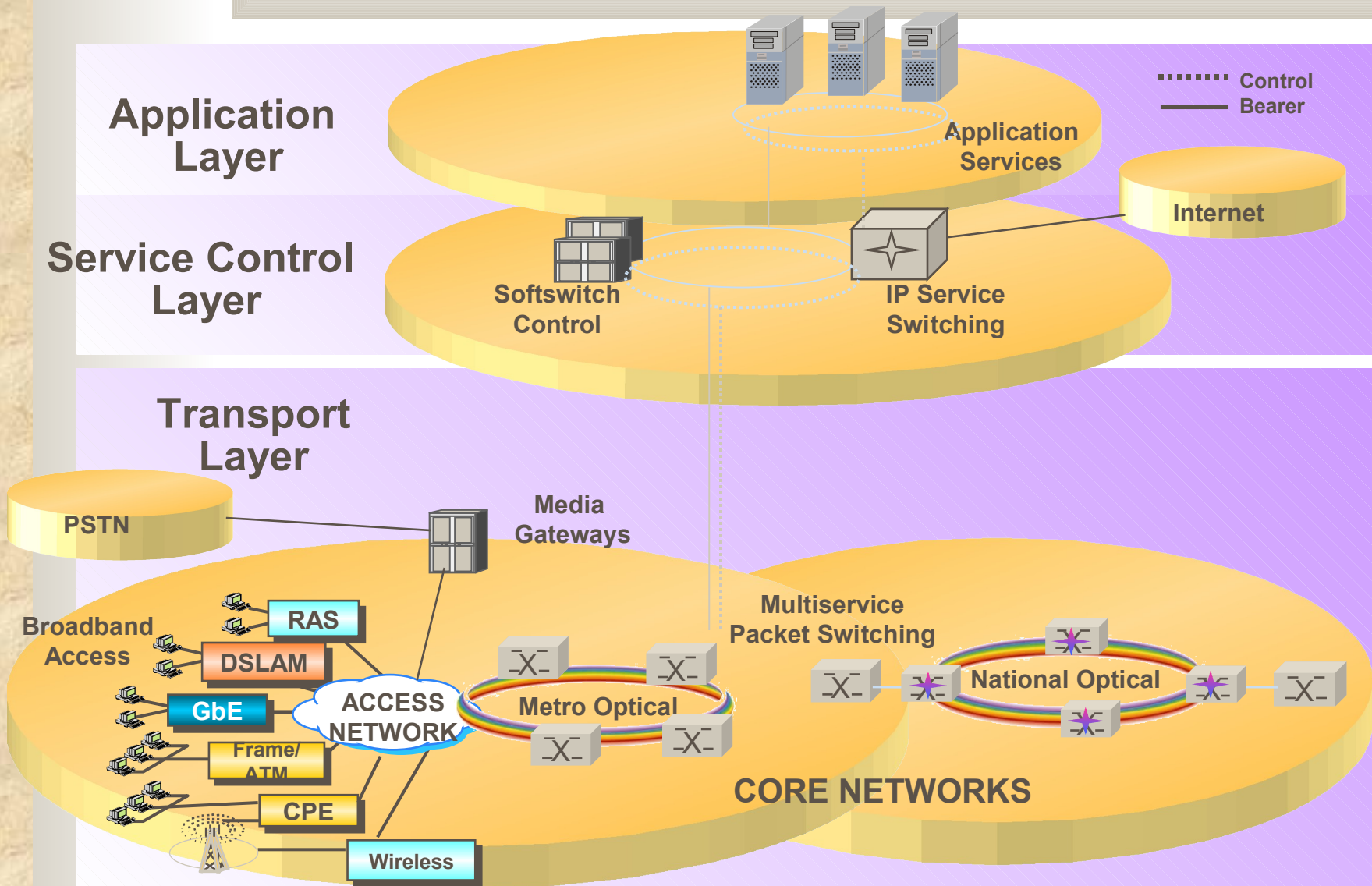
    MGC is also called SOFTSWITCH or Call Server or Call Agent.

- Service Layer: This layer comprises of the equipment that centralises the service logic and data. It is also called as Application Server or Media Server.

- Management Layer: It spans over all the other layers and it comprises of all the management equipment.

NGN – a layered architecture Brings intelligence in *every* layer

Application Layer

Service Control Layer

Transport Layer

Control · · · · · · ·
Bearer ———

Application Services

Internet

Softswitch Control

IP Service Switching

PSTN

Media Gateways

Broadband Access

RAS

DSLAM

GbE

Frame/ATM

CPE

Wireless

ACCESS NETWORK

Metro Optical

Multiservice Packet Switching

National Optical

CORE NETWORKS

Advantages of NGN

- One infrastructure is required.
- One backbone for voice and data services instead of two parallel ones.
- No maintenance of proprietary switching systems.
- Fewer call controlling entities in the network so less capital and operating cost.
- Easier configuration of equipment.
- Fast advanced and new services deployment is possible.

20,000 Port Switch

BEFORE
       AFTER

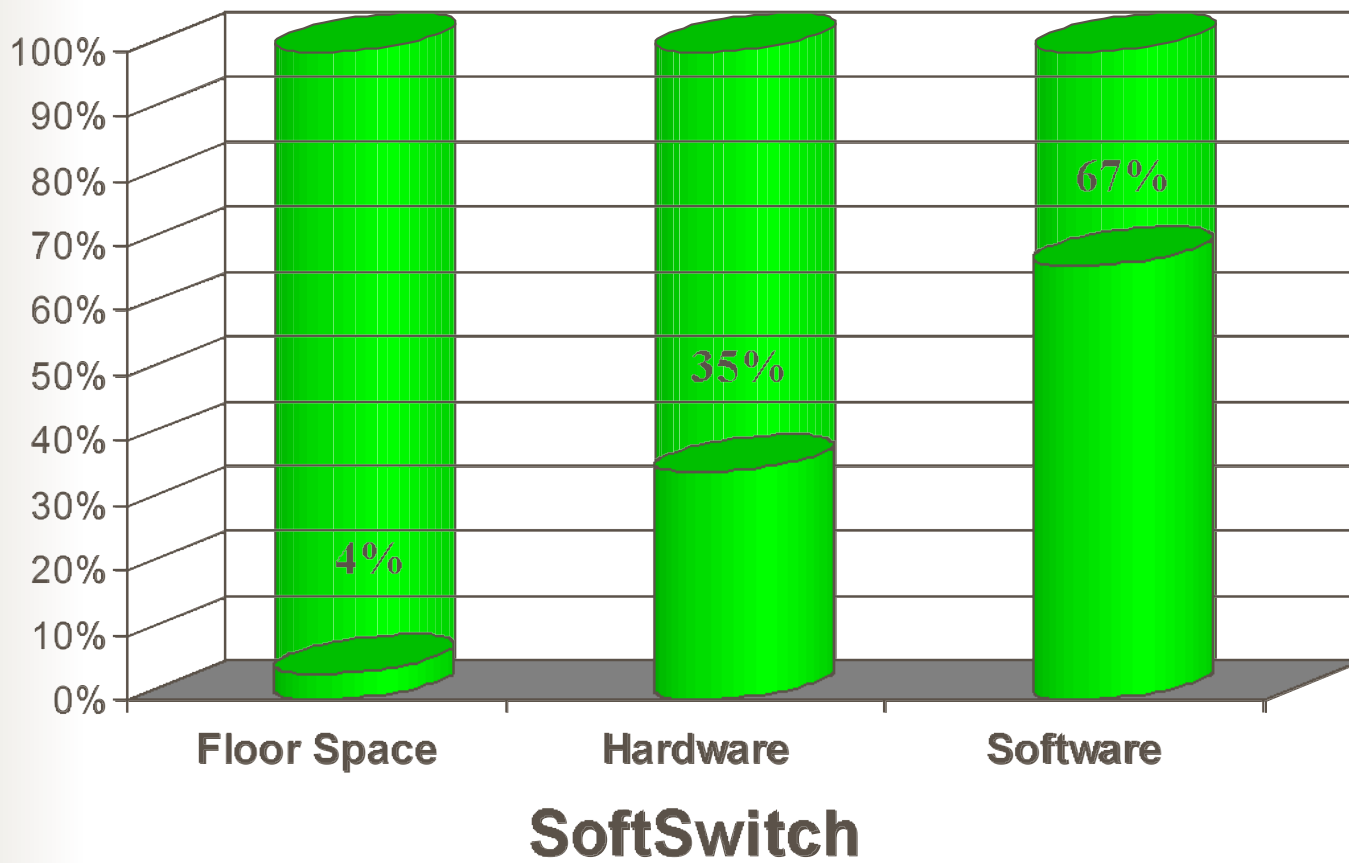# Legacy vs Next Generation

Percent of Traditional Capital Expense

Legacy vs Next Generation

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Percent of Traditional Operational Expense
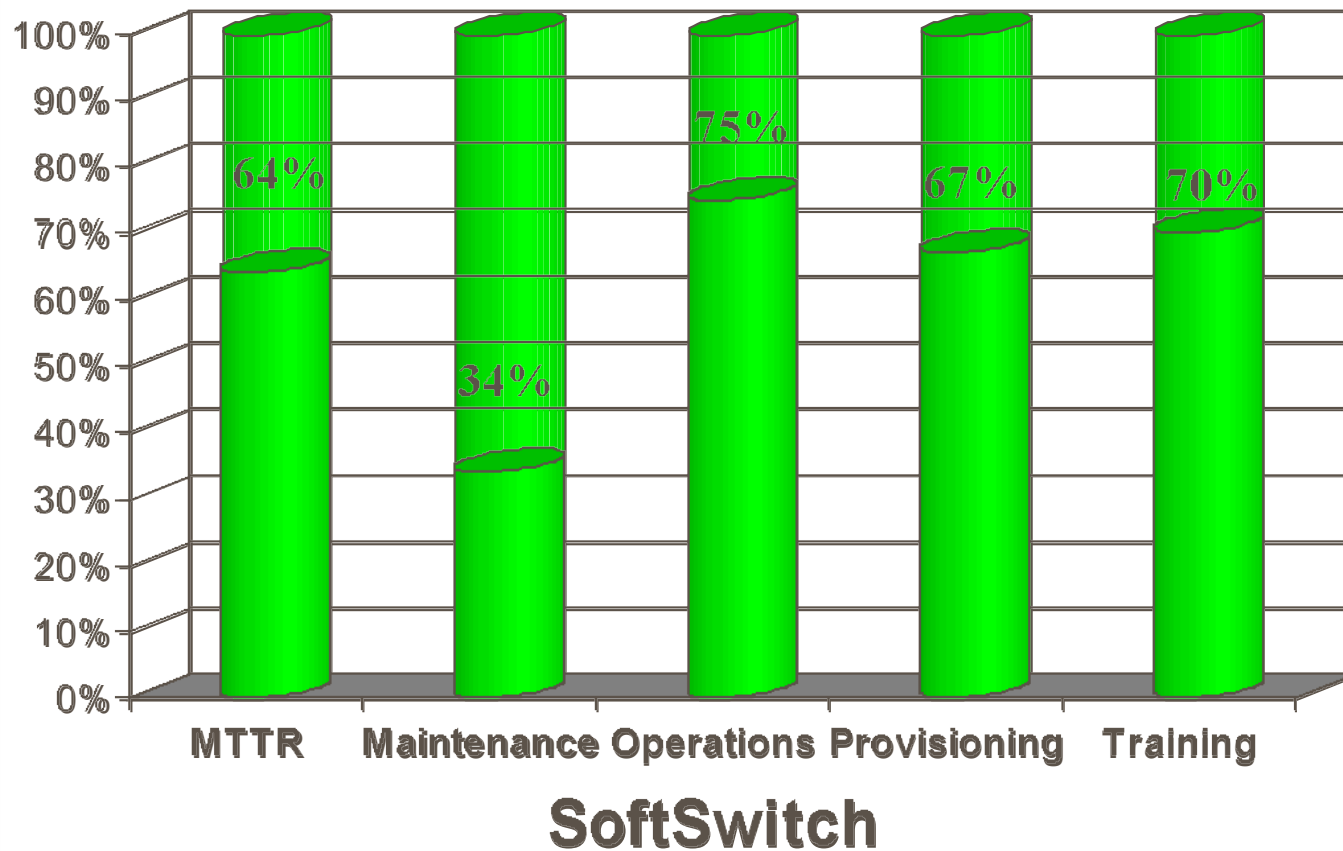
TDM versus IP

Subscriber in one BTS talking to subscriber in another BTS

BTS

TDM NETWORK

MSC

BTS

MSC

TDM versus IP

Subscriber in one BTS talking to subscriber in another BTS

BTS

BTS

IP NETWORK

Voice Payload

Signaling

SOFT SWITCH

TDM versus IP

Subscriber in one BTS roams into other subscriber's BTS

TDM

MSC

MSC

BTS

BTS

Roaming

TDM versus IP

Subscriber in one BTS roams into other subscriber's BTS

Voice Payload

Roaming

BTS

BTS

Signaling

IP

SOFT SWITCH
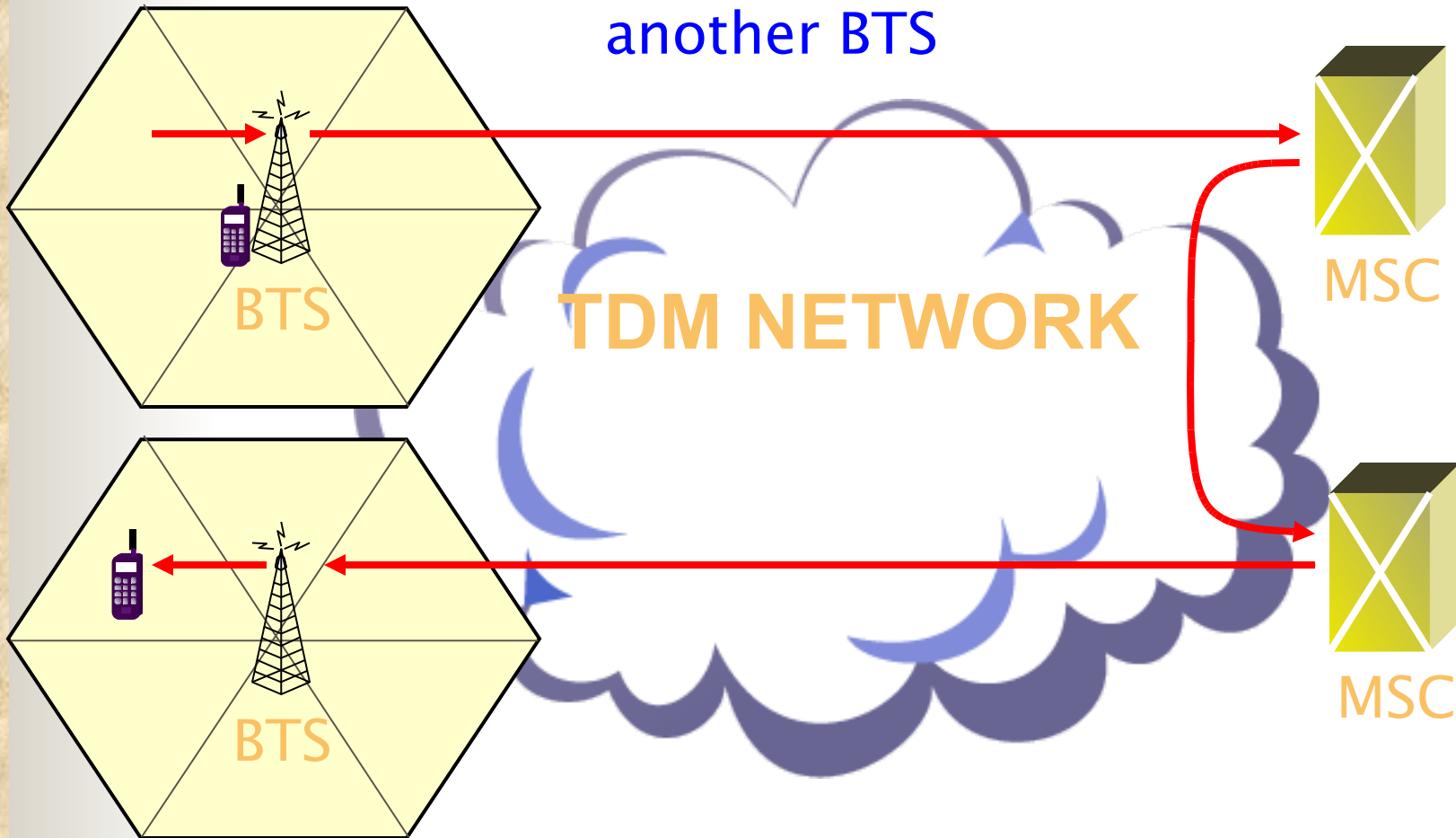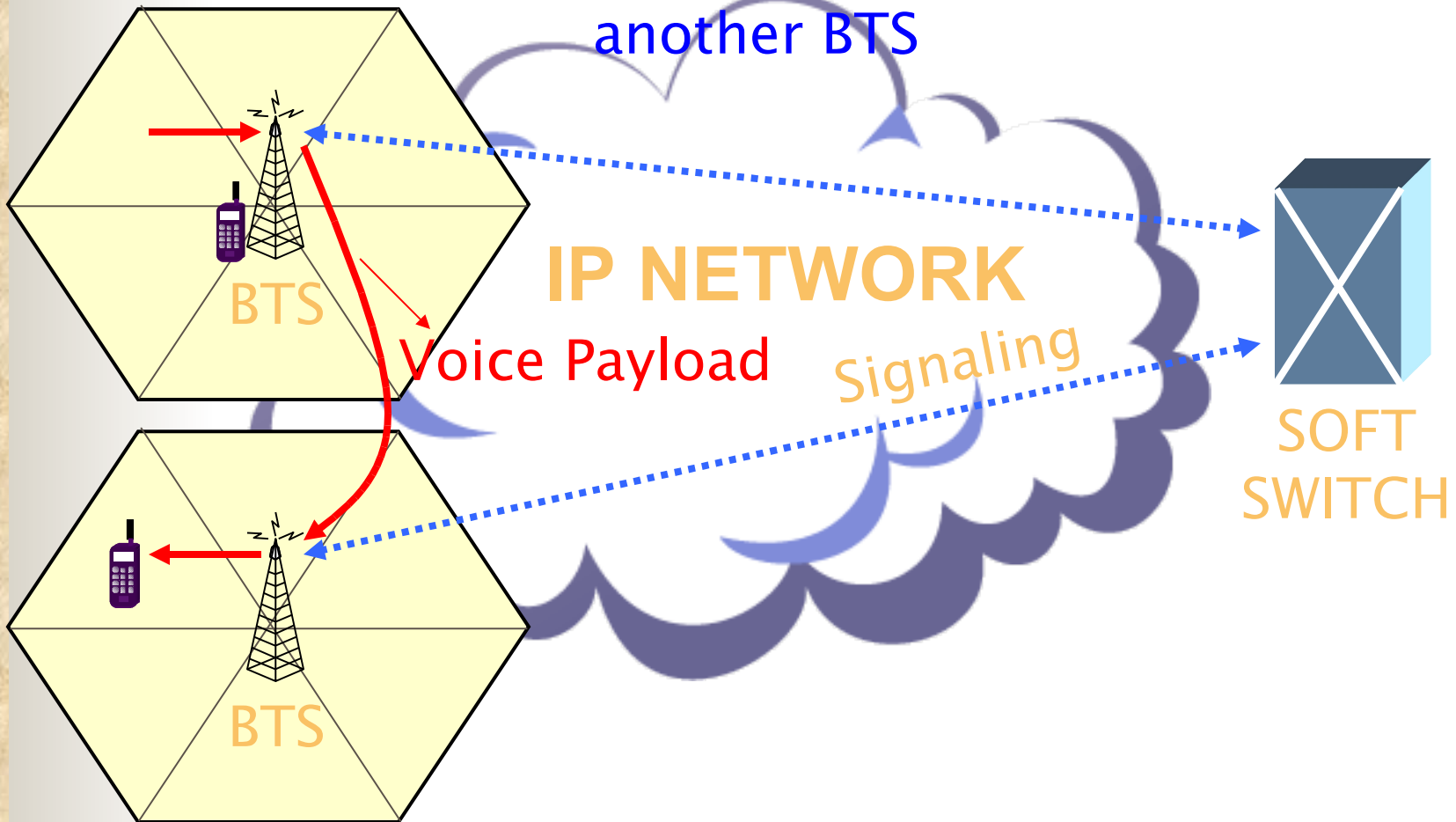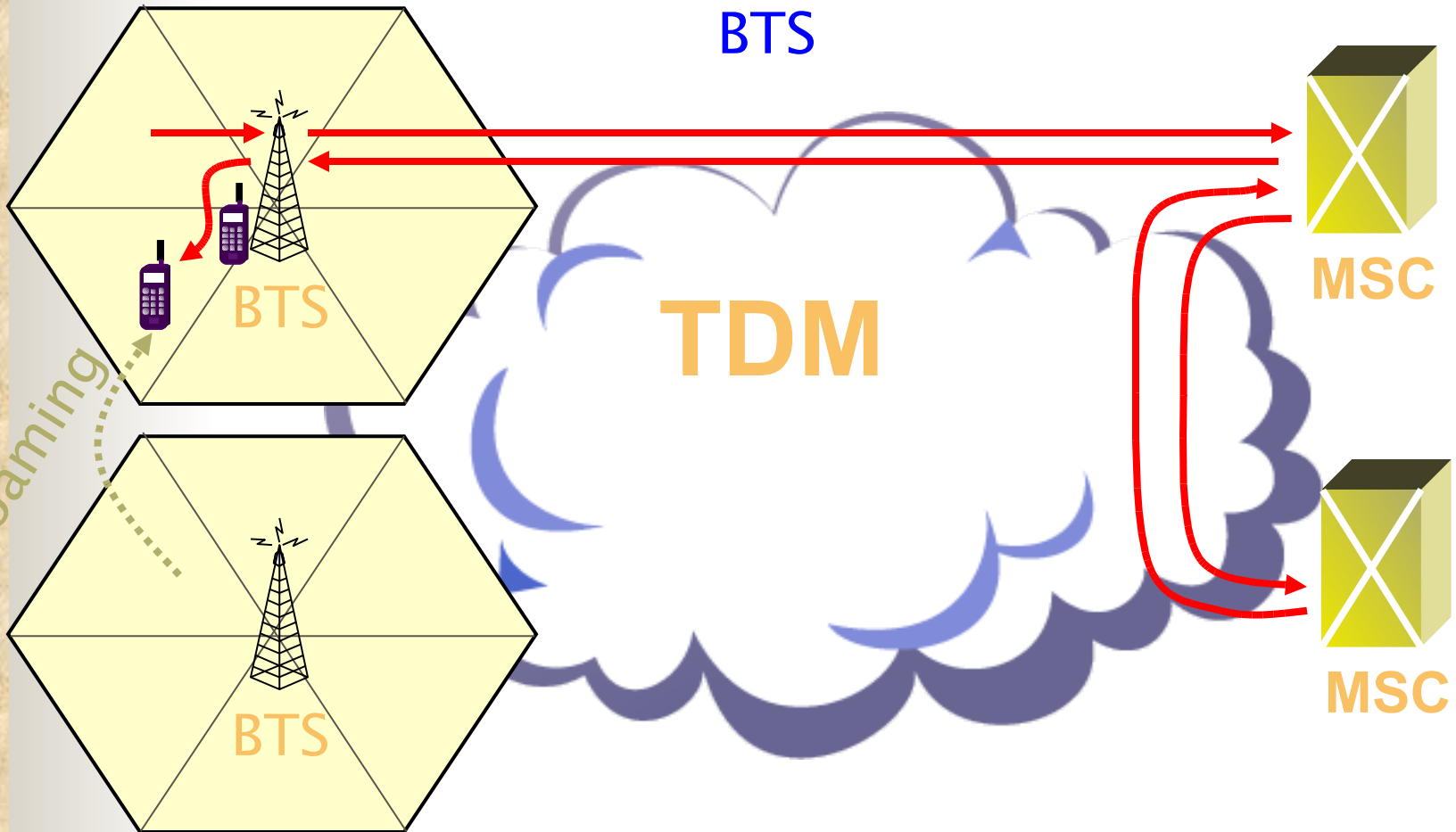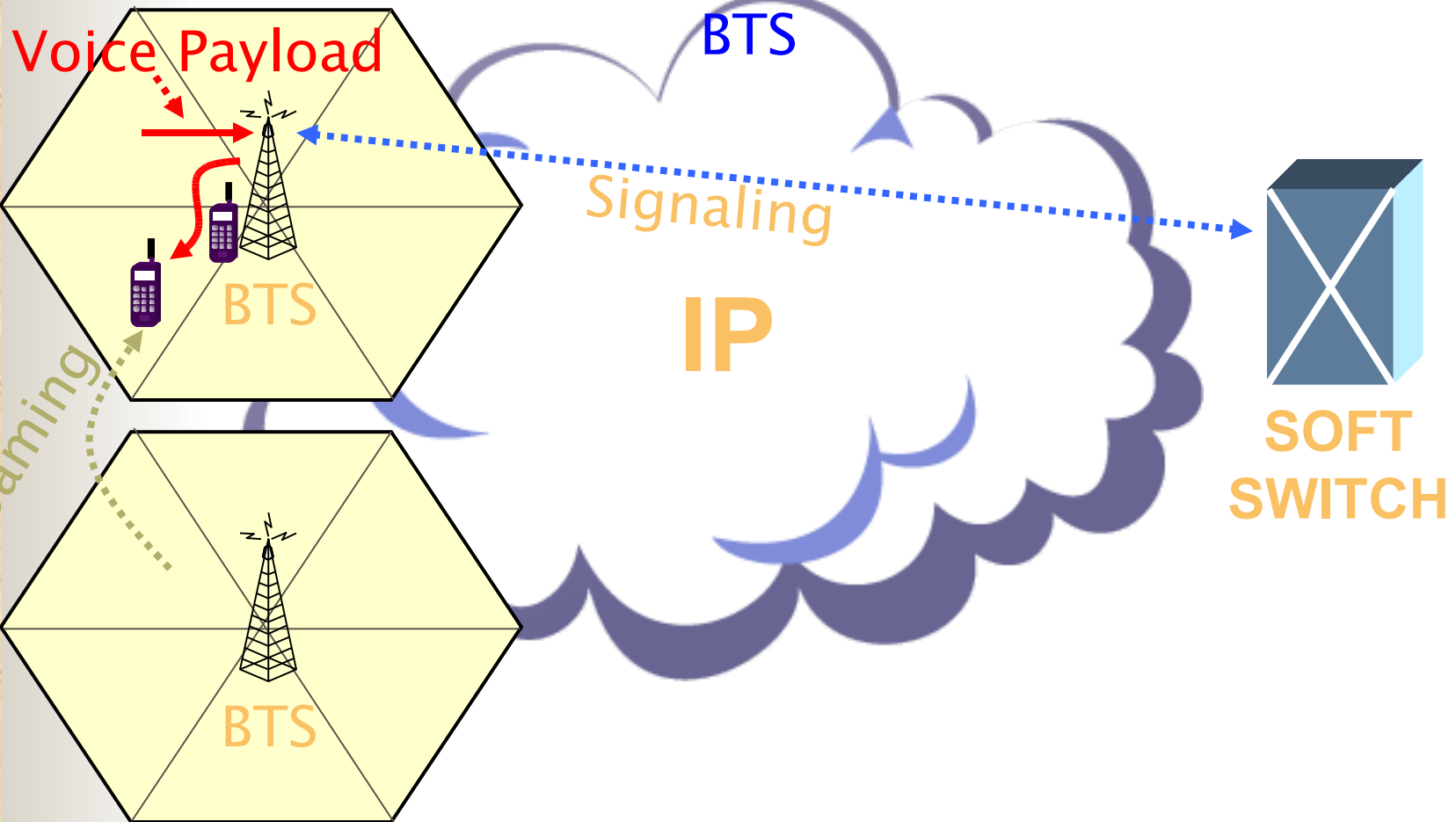
EoIP

In NGN era there is a talk about EOIP which means Everything over IP. That means you can provide any service through NGN platform based on IP.

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The value proposition of NGN

Self-managing Networks

TDM-Technology

NGN IP-Technology

OPEX per line

Network size

Revenue-generating Applications

NGN IP-Technology

TDM-Technology

Revenues per Line

Time

Demand-oriented Infrastructure

NGN IP-Technology

TDM-Technology

Costs per connection

Time
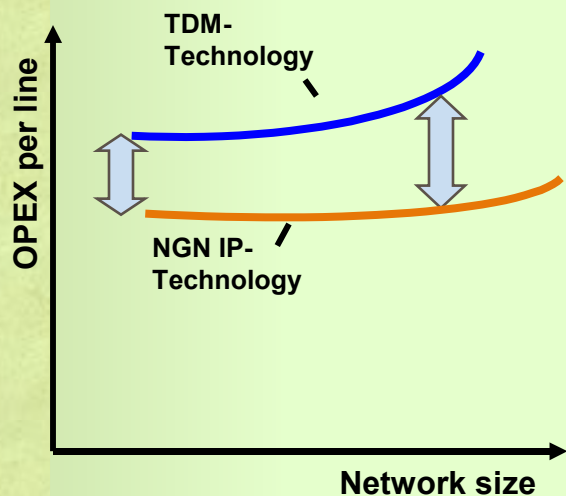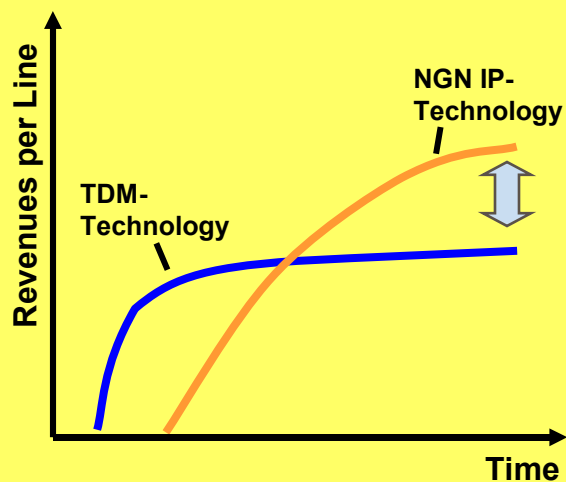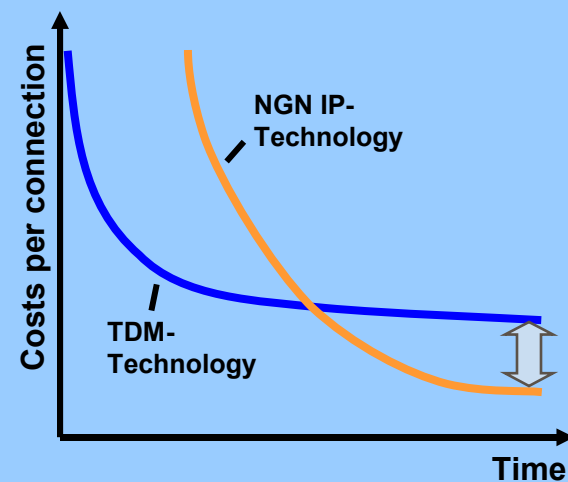
Reduced number of managed nodes & self-routed IP backbone	Innovative applications through common IP denominator	Internet volumes and technological advancements reduce IP costs

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Let's wait for a moment

Some basic terms

- **Service**: A set of functions and facilities offered to a user by a provider

  Here the user or provider can be a pair such as application/application, human/computer, or subscriber/operator

- **Application**: A structured set of capabilities which provide value added functionalities supported by one or more services .

- **IP Multimedia Application**: An application that handles one or more media simultaneously such as audio, video and data in a synchronised way from the user's point of view.

A multimedia application may involve multiple parties, multiple connections and the addition or deletion of resources within a single IP multimedia session. A customer may invoke concurrent IP multimedia applications in an IP multimedia session.

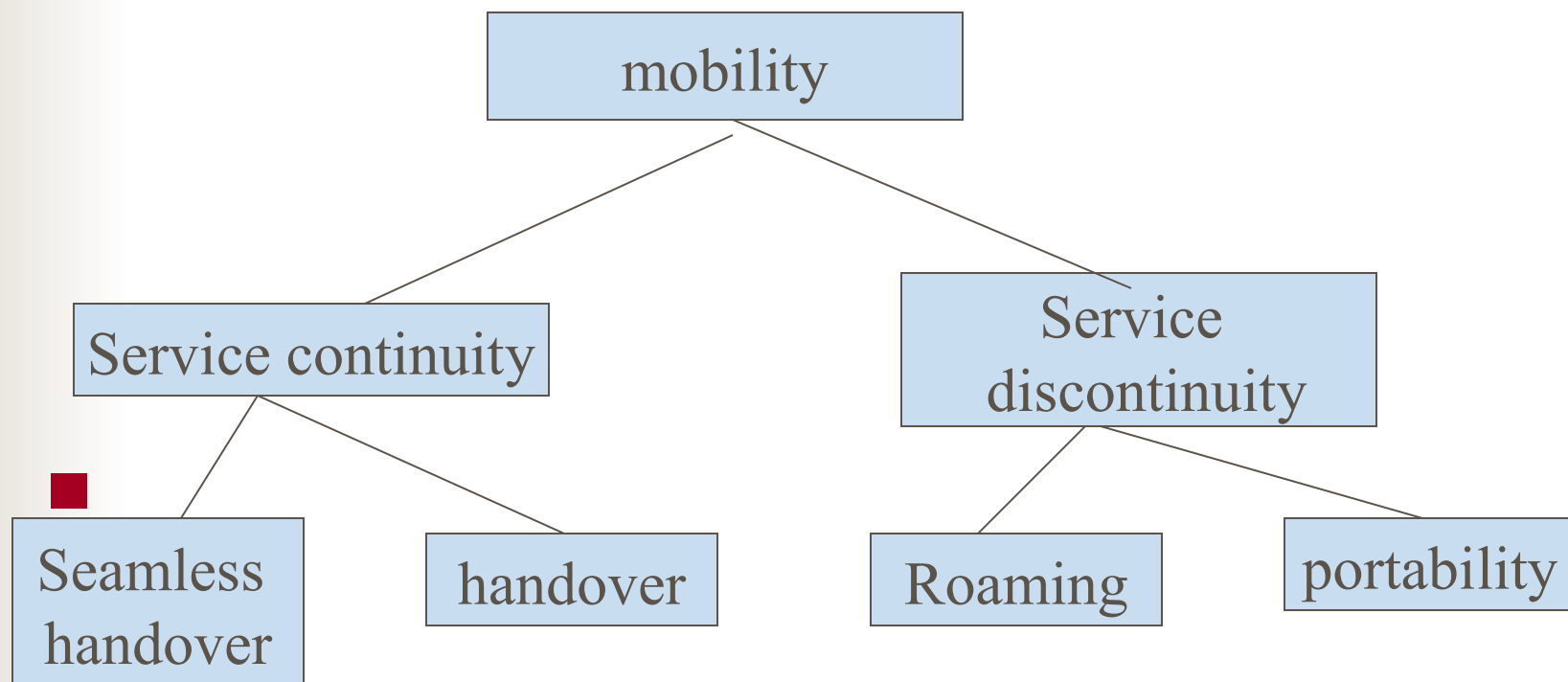## Network Provider and Service Provider

A service provider is an operator that provides telecommunication services to customers whereas a network provider maintains and operates the network components to support services.

Like BSNL is both service provider and Network operator whereas in case of Airtel Bharti is service provider and Erricson is network operator.

Types of the mobility

```
                        ┌──────────────┐
                        │   mobility   │
                        └──────────────┘
                       ╱                ╲
              ┌──────────────────┐   ┌──────────────────┐
              │ Service continuity│   │     Service      │
              └──────────────────┘   │  discontinuity   │
                  ╱        ╲          └──────────────────┘
         ┌──────────┐  ┌──────────┐    ╱            ╲
         │ Seamless │  │ handover │  ┌──────────┐ ┌────────────┐
         │ handover │  └──────────┘  │ Roaming  │ │ portability│
         └──────────┘                └──────────┘ └────────────┘
```

- **Mobility**: The ability for the user to communicate and access services irrespective of the location or technical environment.

- **Service continuity**: The ability for a mobile object to maintain ongoing service in the current state.

- **Service discontinuity**:The inability for a mobile object to maintain ongoing service in the current state.

- **Seamless handover:** The service continuity without any impact on the SLA
- **Handover:** The service continuity with some impact on the SLA
- **Roaming:** The ability of the user to access services as per their profile while moving outside their home network.
- **Portability:** Mechanism that allows a user to retain the same directory number irrespective of the service provider.

- **Terminal mobility**: The mobility when the same terminal equipment is used at different locations.

- **Personal Mobility**: The mobility when the user changes the terminal used for network access at different locations. The services are provided on the basis of a personal identifier.

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NGN or IMS?

- 3GPP is working on 3G UMTS and in Rel5 on **IMS (IP multimedia Subsystem)** Which is evolution of PLMN network to NGN

  i.e.NGN for GSM/3G network is **IMS**

NGN or IMS?

- ITU is the international standardisation body working for **Next generation networks** and has set the framework for NGN for all telecom network/services.

- 3GPP is working on IMS(for mobile).

- 3GPP2 equivalent of IMS is the MMD (Multimedia Domain), fully interoperable with 3GPP IMS

  ETSI (European Telecommunications Standards Institute) is one of the member of the 3GPP.

- **TISPAN(Telecommunication and Internet converged Services and Protocols for Advanced Networking)** is working on Fixed and mobile convergence and a common NGN for both by using IMS as a core. It will adopt IMS of 3GPP as it is.

- It was formed in 2003 from the amalgamation of the ETSI bodies **Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON)** and **Services and Protocols for Advanced Networks (SPAN)**

Making Standards

CableLabs®

MultiService Forum

I E T F

3G

A GLOBA

ANSI

tispan

oma
Open Mobile Alliance

THE STANDARDS ARENA IS HIGHLY POPULATED

The AY Group

ATIS
Alliance for Telecommunications Industry Solutions

3G

FMCA
Fixed-Mobile Convergence Alliance

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ITU-T Standardization Work

- **NGN Focus Group (FGNGN) scope completed in Dec'05**
- **Work continues in the various ITU-T Study Groups according to their allocated tasks (Questions)**
- **SG 13 has a continuing (and lead) NGN Role**
- **The ITU-T has announced a "NGN Global Standards Initiative (NGN-GSI)" with the Goal "to further strengthen the ITU-T's leading role in NGN standard work"**

What is being done?

- 3GPP members are working in the IETF to ensure that the underlying protocols fit with 3GPP (mobile service) requirements

3GPP has developed IMS, it is now stable, and is being enhanced

OMA is defining services based on the 3GPP IMS service platform

ETSI TISPAN is busy defining the NGN network based on 3GPP IMS

3GPP and ETSI TISPAN are meeting jointly to adapt 3GPP IMS to fixed access networks

TISPAN produces detailed implementable deliverables that cover NGN services, architectures, protocols, QoS, security and mobility aspects within fixed networks.

- ETSI TISPAN is feeding back to the ITU-T and creating a set of implementable NGN Rel-1 Specifications/standards.

Thank You
& Any Question?

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