

NGN Interconnection Standards & Protocols

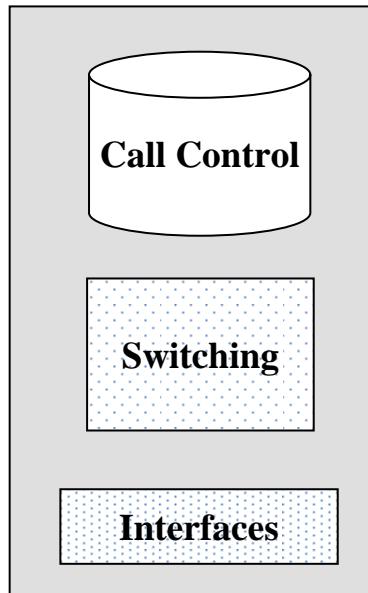
A G E N D A

- NGN ENVIRONMENT
- LICENSING CONDITIONS
- REGULATORY INITIATIVES
- INTERCONNECTION
- PROTOCOLS
- ISSUES

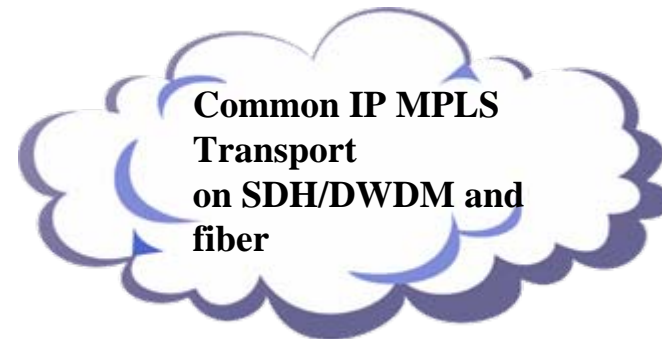
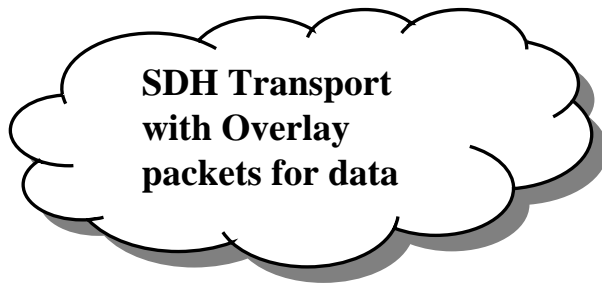
R. R. Mittar
DDG(NGN), TEC

NGN CONCEPT

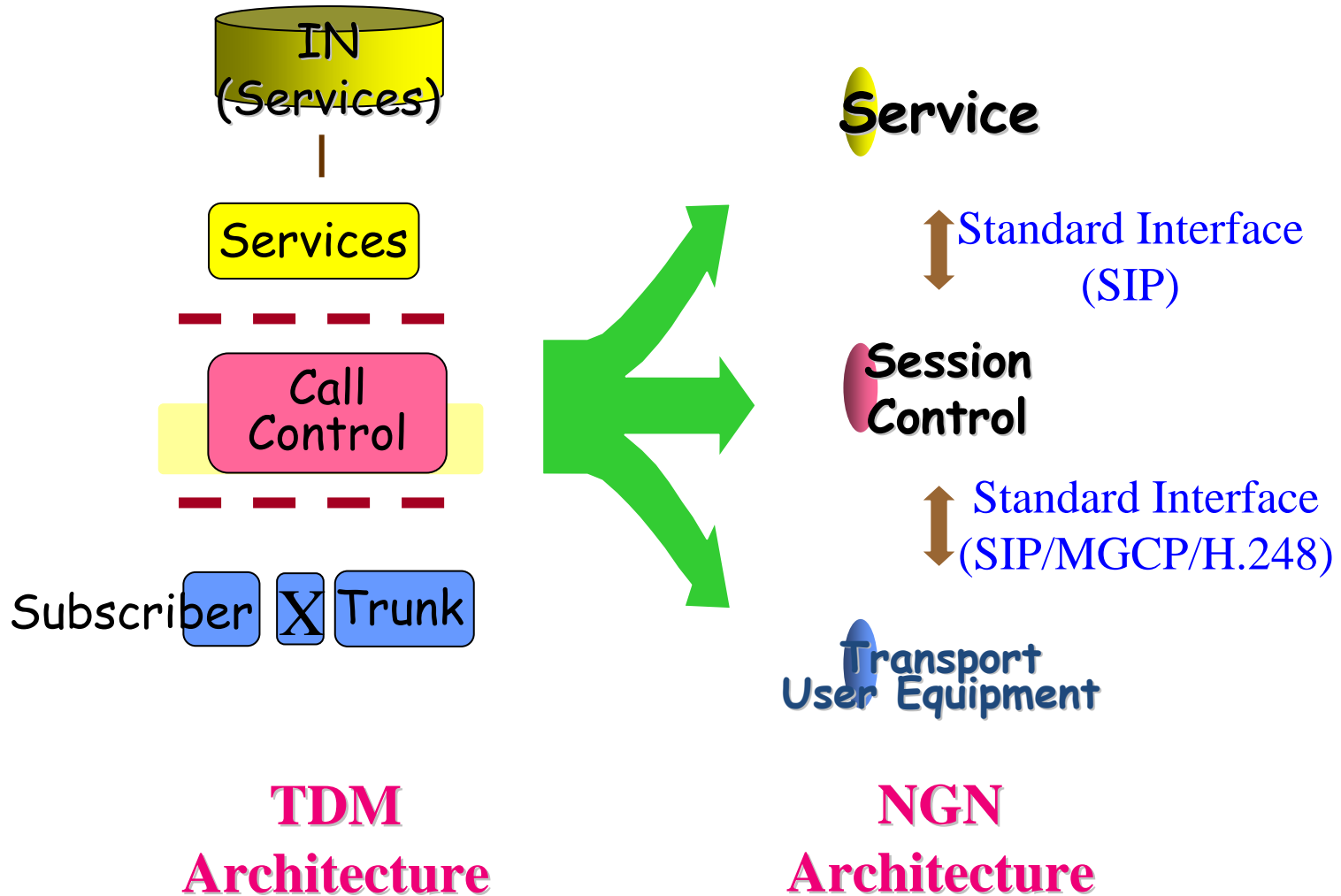
Central Office Switch



NGN Components

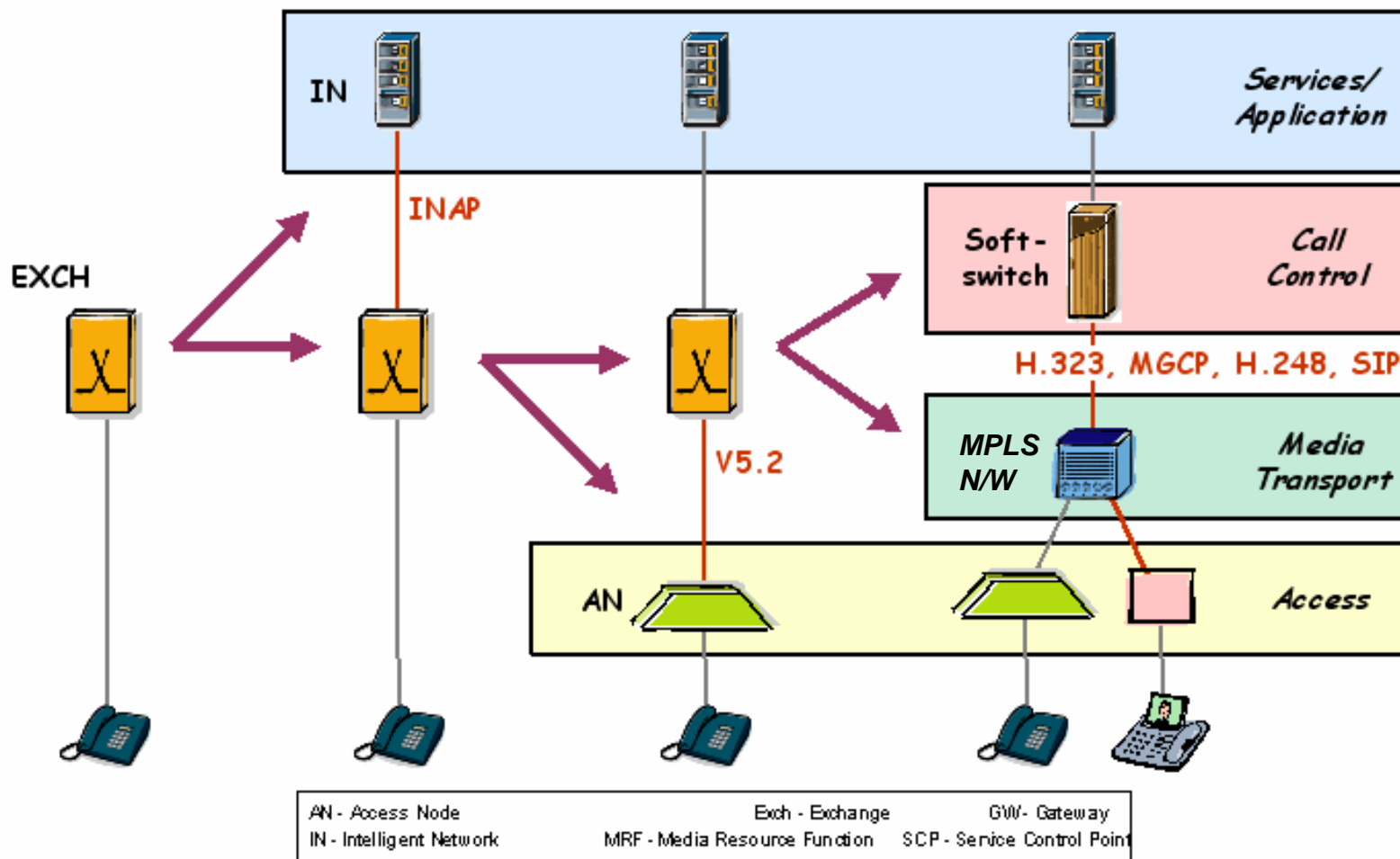


NGN CONCEPT

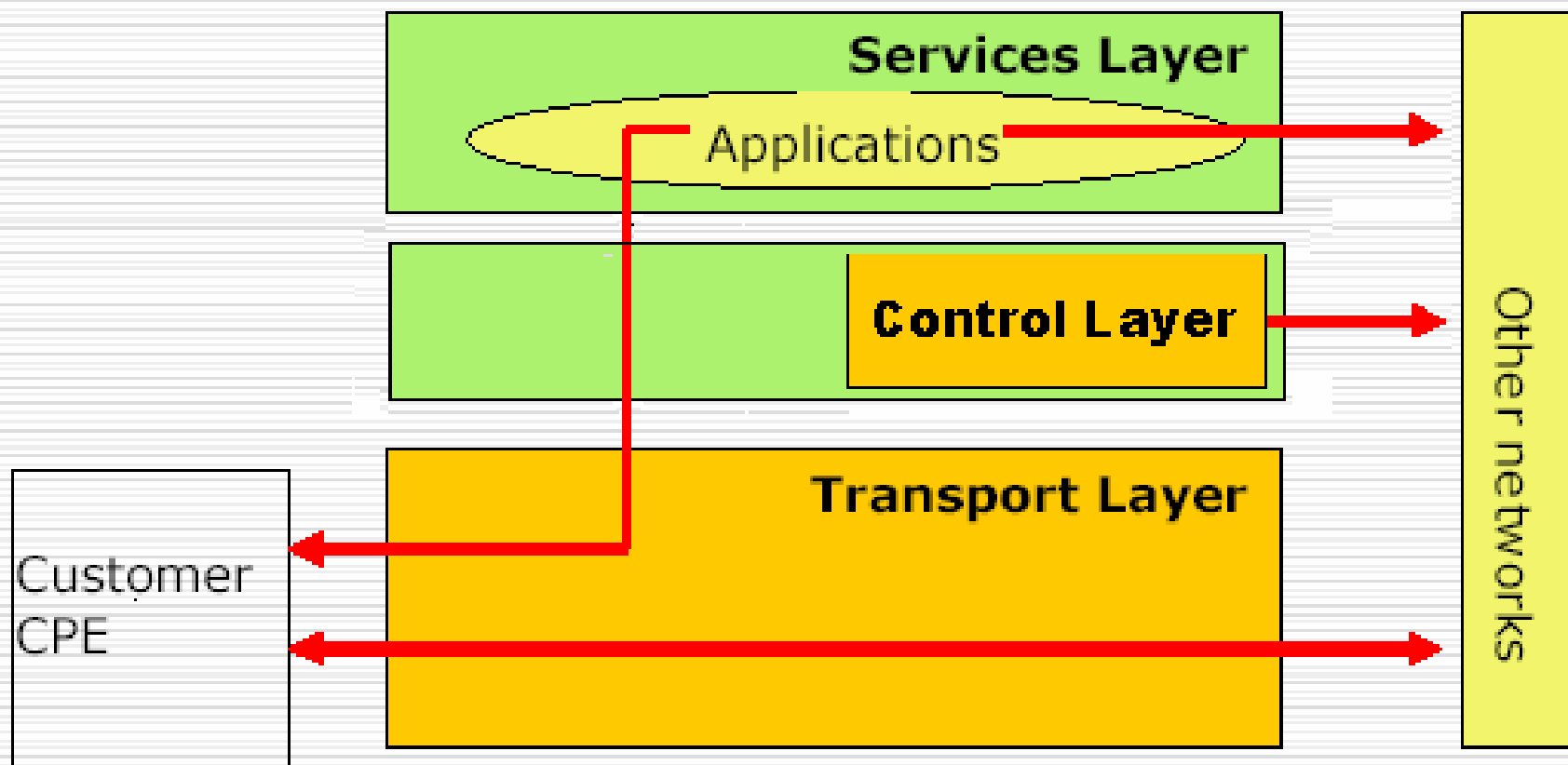


NGN Principles: Technology Evolution Towards NGN

-> Separation of layers



Next Generation Networks (NGN)



- In the transport layer, IP traffic exchanged at layer 2 or 3
- An application like VoD may be provided directly as shown
- A service may require more than one type of interconnection

Next Generation Networks (NGN)

- A crucial feature of NGN architecture is the separation of the main functional levels.
- NGN strategy of implementation typically is based on a horizontal platform that means separation of service, transport and control layers.
- The service, transport and control layers thus be technically and commercially separated and provided by different market players. Therefore, it has to be ensured that interconnection is possible at all functional levels in a reasonable manner in order to ensure overall service interoperability

LICENSING CONDITIONS

Interconnection between the networks of different SERVICE PROVIDERs shall be as per National Standards of CCS No.7 issued from time to time by Telecom Engineering Centre (TEC) and also subject to technical feasibility and technical integrity of the Networks and shall be within the overall framework of interconnection regulations issued by the TRAI from time to time. (Clause 26.1 of UASL agreement)

LICENSING CONDITIONS (Cont...)

It shall be mandatory for the LICENSEE to provide interconnection to all eligible Telecom Service Providers as well as NLD Operators whereby the subscribers could have a free choice to make inter-circle/ international long distance calls through NLD/ ILD Operator.
(Clause 26.5 of UASL agreement)

LICENSING CONDITIONS (Cont...)

- Direct interconnectivity among all Telecom Service Providers in the licensed SERVICE AREA is permitted. LICENSEE shall interconnect with other Service Providers, subject to compliance of prevailing regulations, directions or determinations issued by TRAI. (Clause 26.6 of UASL agreement)
- Point of Inter-connection (POI) between the networks shall be governed by Guidelines/ Orders/ Directions/ Regulation issued from time to time by Licensor/ TRAI. (Clause 26.7 of UASL agreement)

LICENSING CONDITIONS (Cont...)

- The LICENSEE is permitted to provide, SERVICE by utilizing any type of network equipment, including circuit and/or packet switches, that meet the relevant International Telecommunication Union (ITU)/ Telecommunication Engineering Center (TEC) / International standardization bodies such as 3GPP/3GPP-2/ETSI/IETF/ ANSI/EIA/TIA/IS. (Clause 2.2 (d)(i)of UASL agreement)

LICENSING CONDITIONS (Cont...)

- The LICENSEE shall ensure the Quality of Service (QoS) as prescribed by the LICENSOR or TRAI.
- The LICENSEE shall adhere to such QoS standards and provide timely information as required therein

(Clause 28(i) of UASL agreement)

Recommendations of TRAI NGN-eCO

- Two NGN operators are to be interconnected through Session Border Controller (SBC).
- NGN and traditional PSTN/PLMN are to be interconnected through Media Gateway and Signalling Gateway.
- The interconnection between two NGN networks of different operators need to be tested as per the standards defined by **TEC** or any other standard independent agency nominated by the Licensor/TRAI.
- **TEC** is to prepare Interface Requirement (IR) for connectivity between two NGN networks.

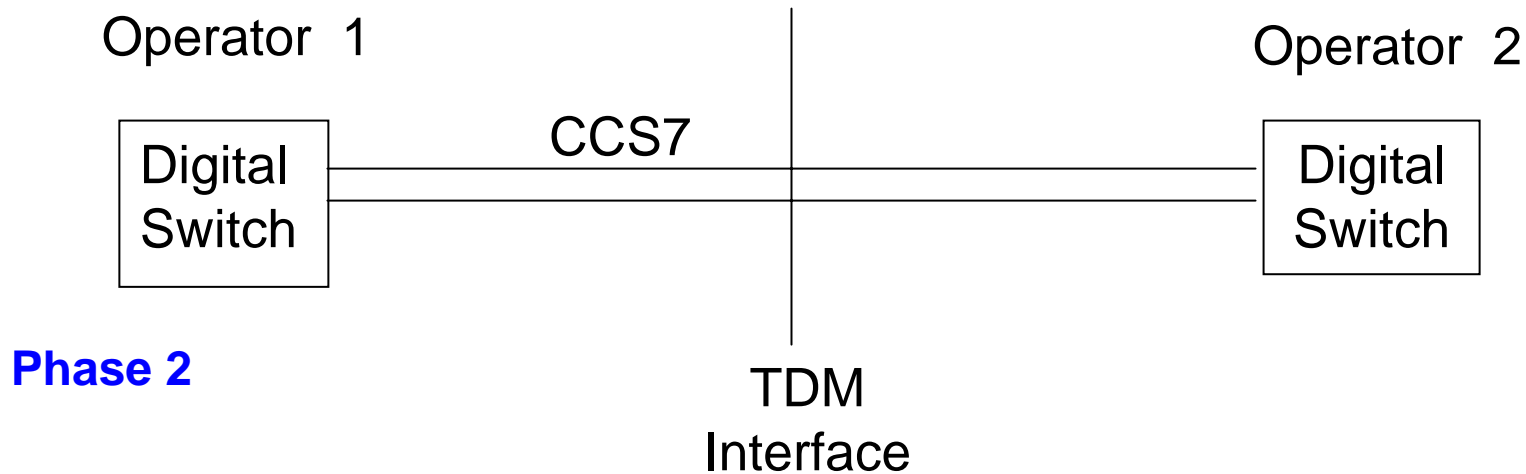
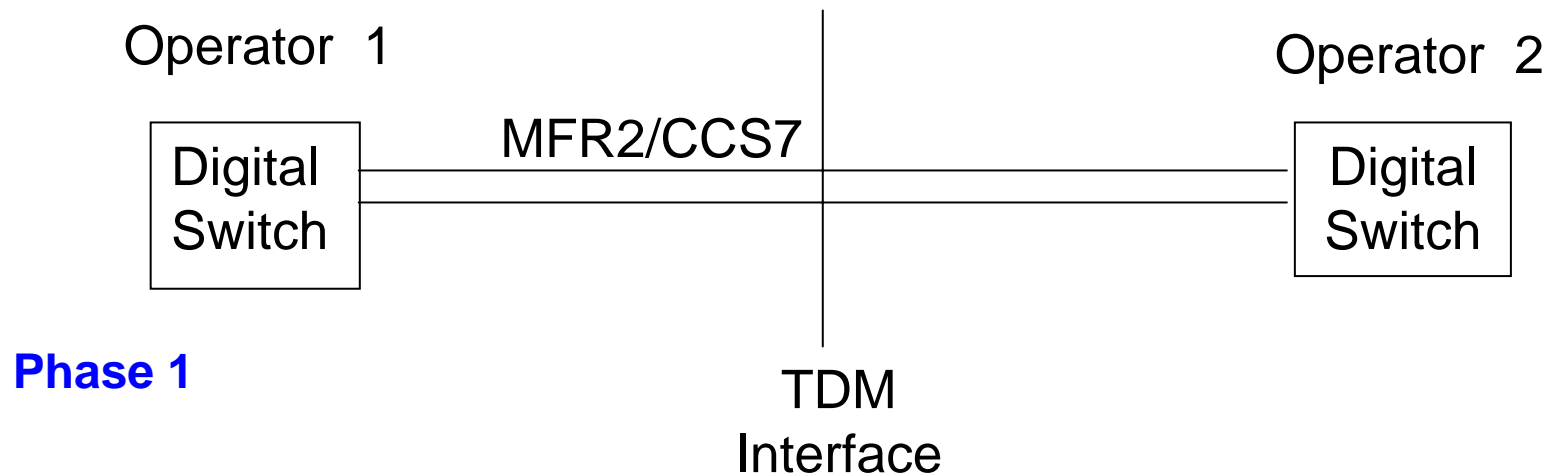
INTERCONNECTION: INTRODUCTION

Interconnection in PSTN/PLMN are based on Network Interface Characteristics

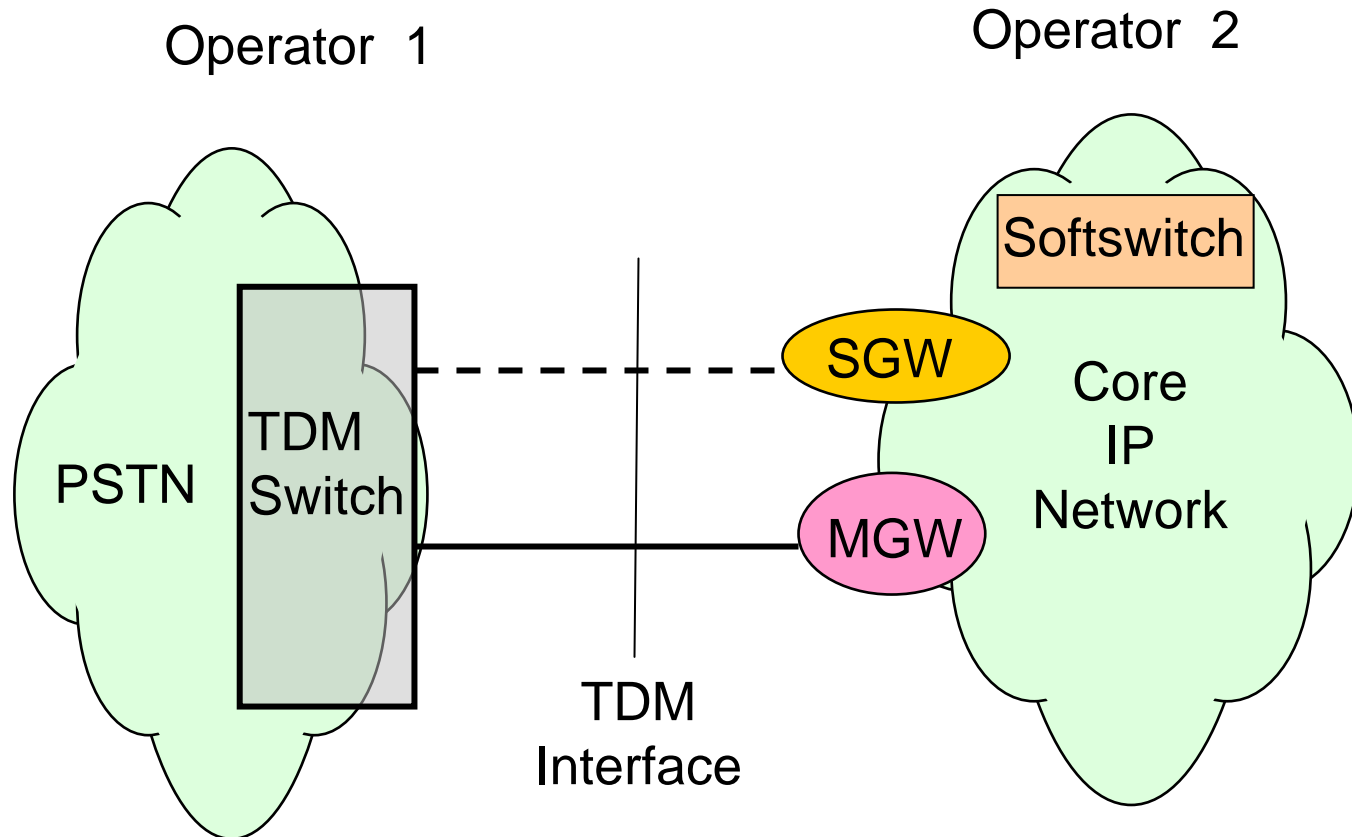
- CCS7 signalling
- Synchronisation
- Transmission parameters
- EMI/EMC Requirements
- Safety Requirements
- Environmental Conditions

At present TEC issues Interface Requirement Certificate for interconnection between two networks according to TEC IRs

Interconnection Evolution -1

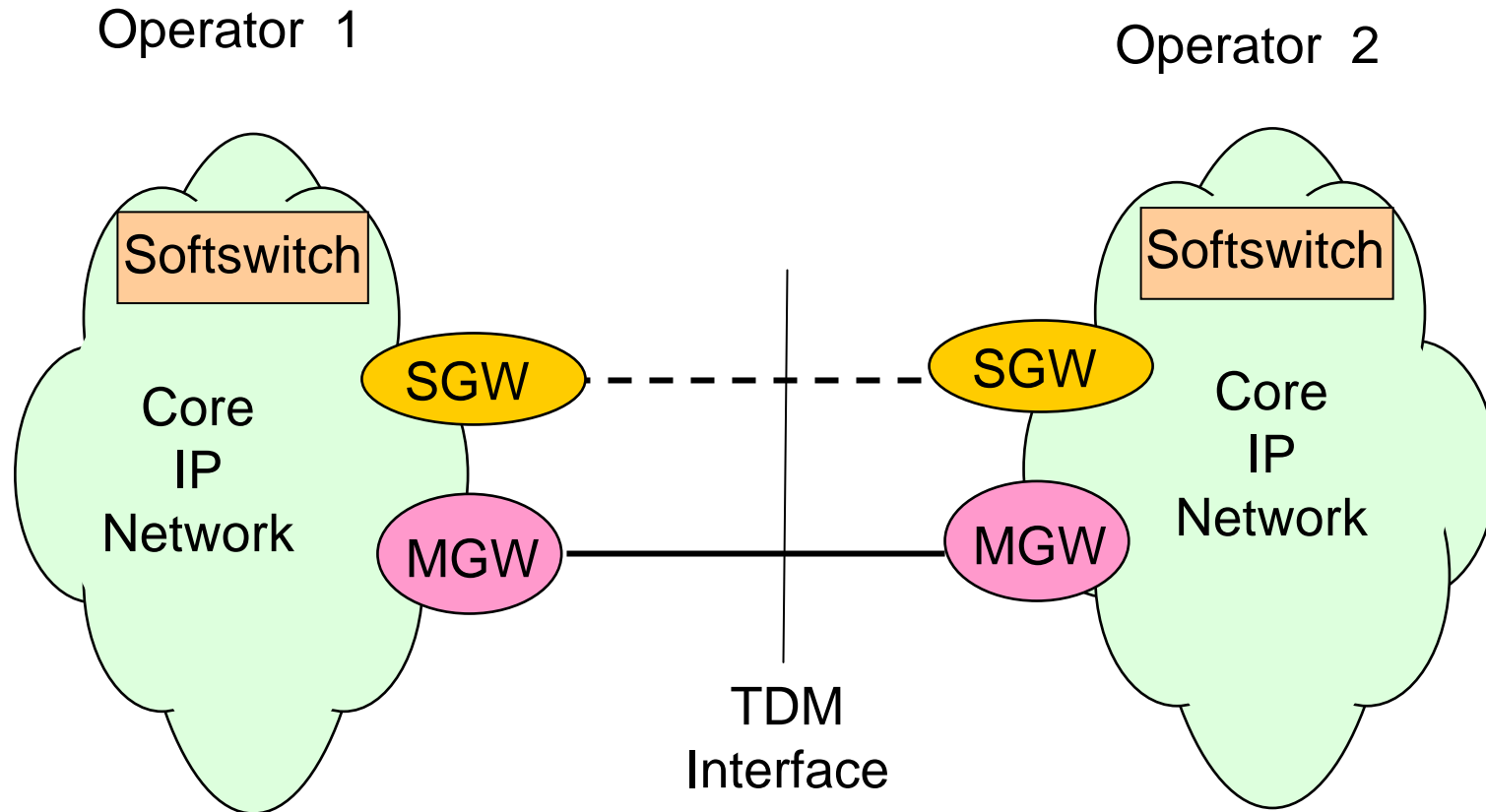


Interconnection Evolution - 2



Present Scenario of interconnecting PSTN and IP networks

Interconnection Evolution -3

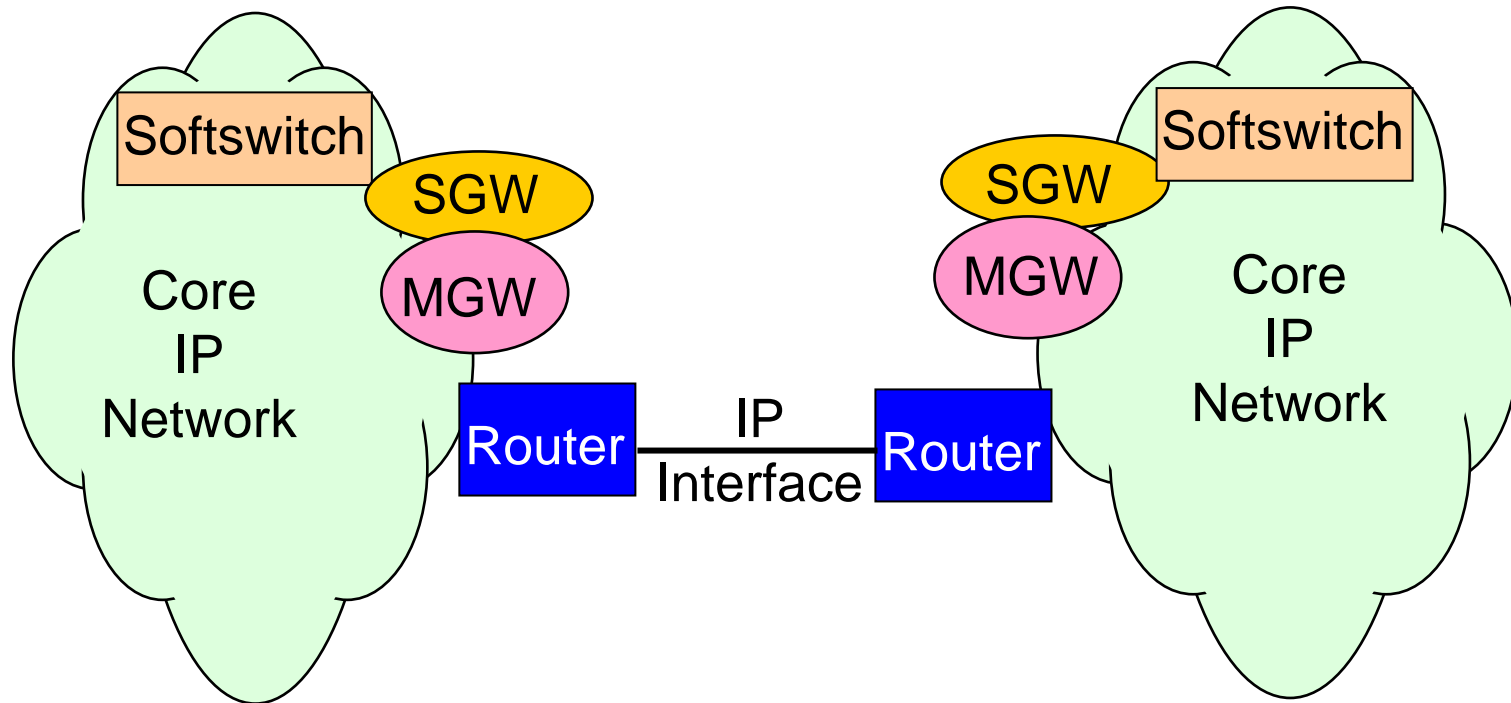


Interconnection between two IP networks

Interconnection Evolution -4

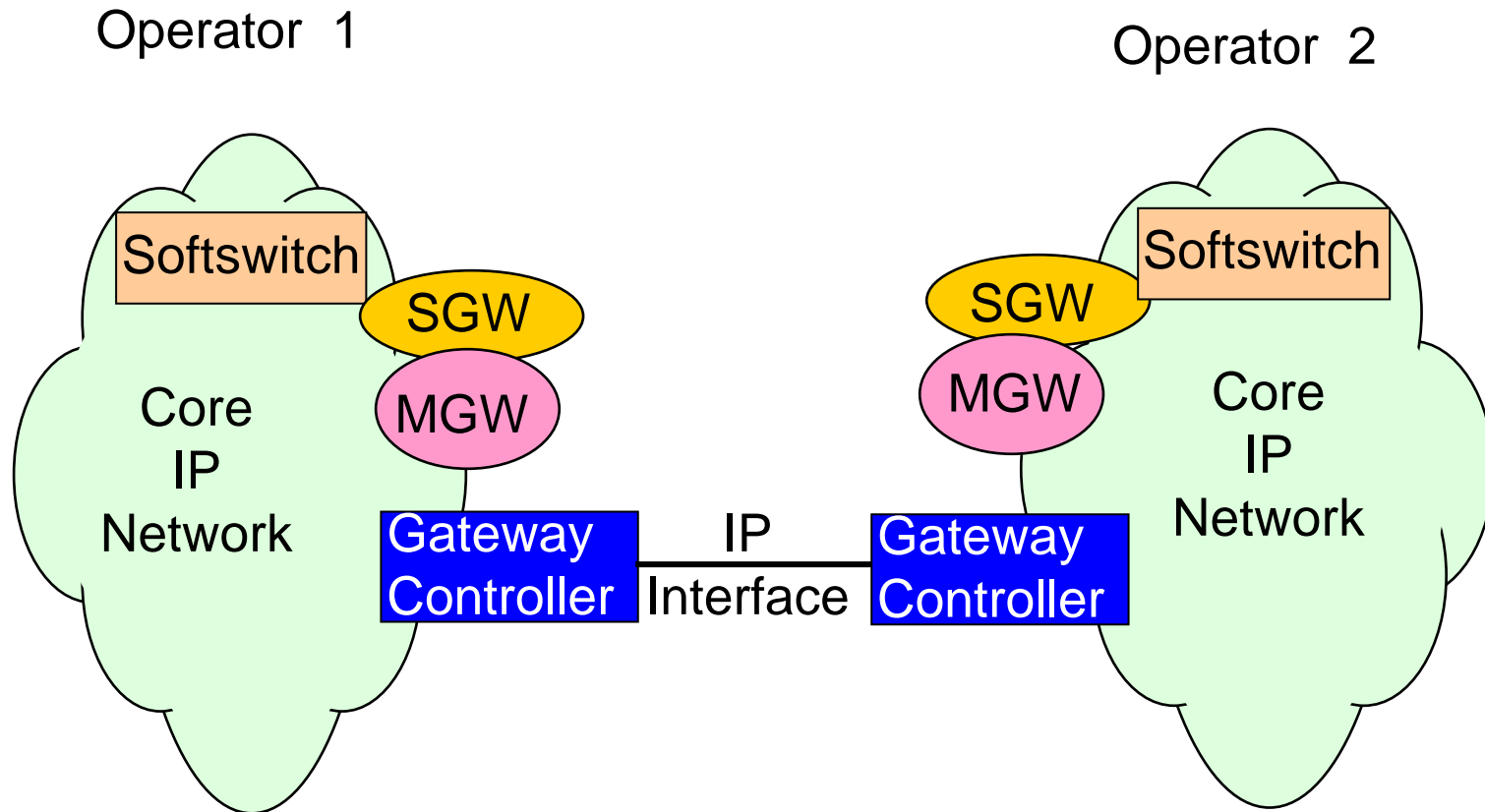
Operator 1

Operator 2



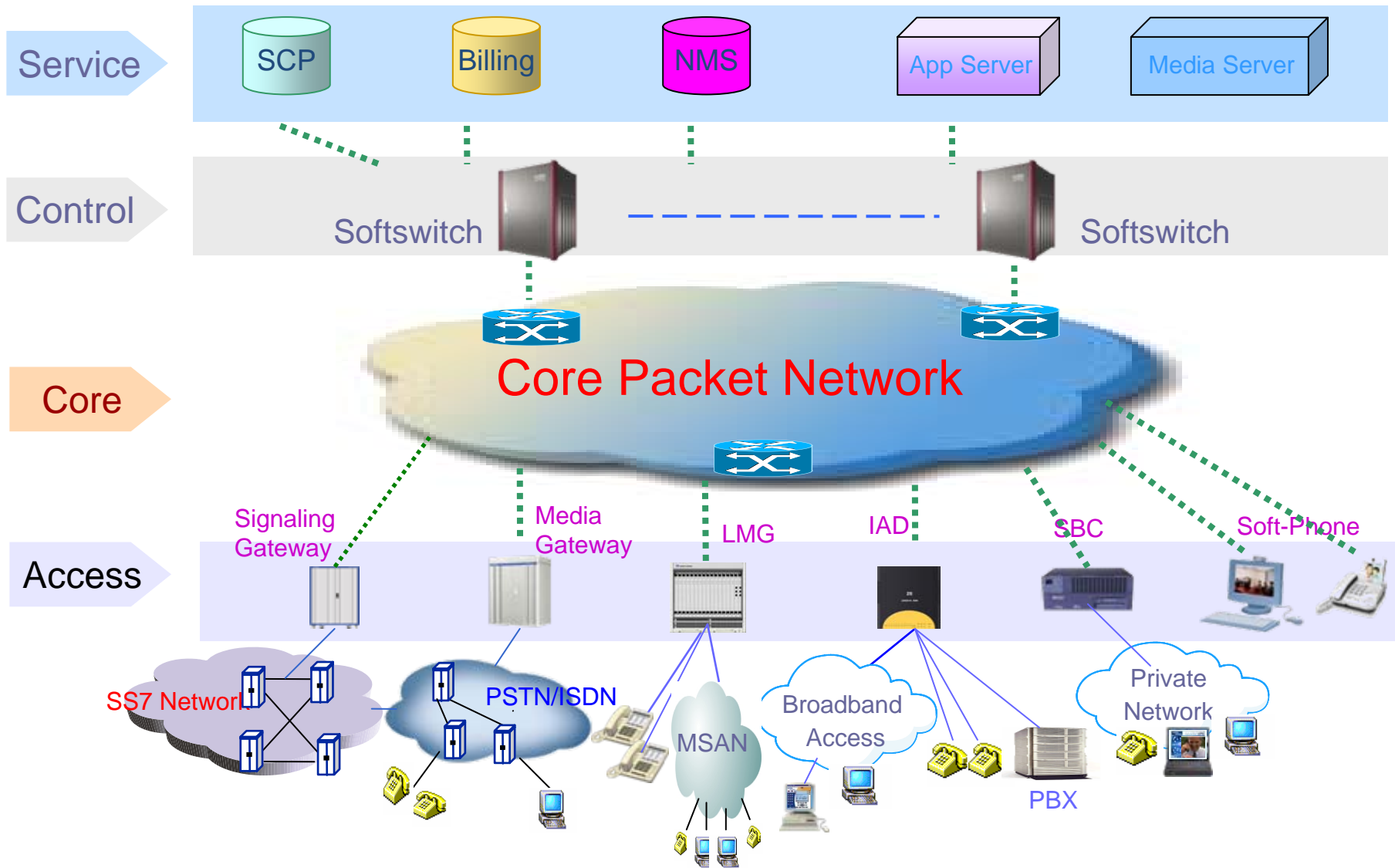
Interconnection between two IP networks using routers

Interconnection Evolution -5



Interconnection between two IP networks using Gateway Controller

The Soft Switch Approach



Interconnection in NGN

Next Generation Network (NGN) should be capable of interworking with:

- Public Switched Telephone Network (PSTN)
- Public Land Mobile Networks (PLMN)
- Internet
- Broadcast networks
- Packet cable networks
- Access Networks (Access Gateways, CPE devices)

Interconnection in NGN

The interconnection function should support

- Control and signalling interworking;
- Media interworking;
- Application services protocol interworking

Interconnection in NGN

- In all cases, the network must take certain measures to
 - Protect itself by security filtering
 - Ensure Protocol Interworking
 - Enable routing by Global Address
- These functions must be performed at the border of the network.
- The Network border is a point where signalling and media cross over from one network to another managed by different entities.

Issues related to Interconnection in NGN

- Interoperability issues due to a wide variety of protocol variants, network topologies, and media codecs
- End-to End QoS across networks
- Security, both at UNI and NNI
- Monitoring (SLAs, Lawful Intercept, etc.)
- Privacy of network topology and user information
- Point of Interconnection

Session Border Controller (SBC)

- SBC is a device that is deployed at the edge and core of a service provider's network to control signalling and media streams as they enter and exit the network.
- The “edge” is any IP-IP network border such as between a service provider and a customer OR between a service provider and an enterprise network.
- The “core” is any IP-IP network border such as those between two service providers.

Session Border Controller (SBC)

The physical connectivity between two NGN operators has to be through a device having Session Border Controllers (SBC) functionality which support different physical interfaces with 1+1 redundancy with no single point of failure for that device.

Session Border Controller (SBC)

The SBC has the following functionalities Network Security.

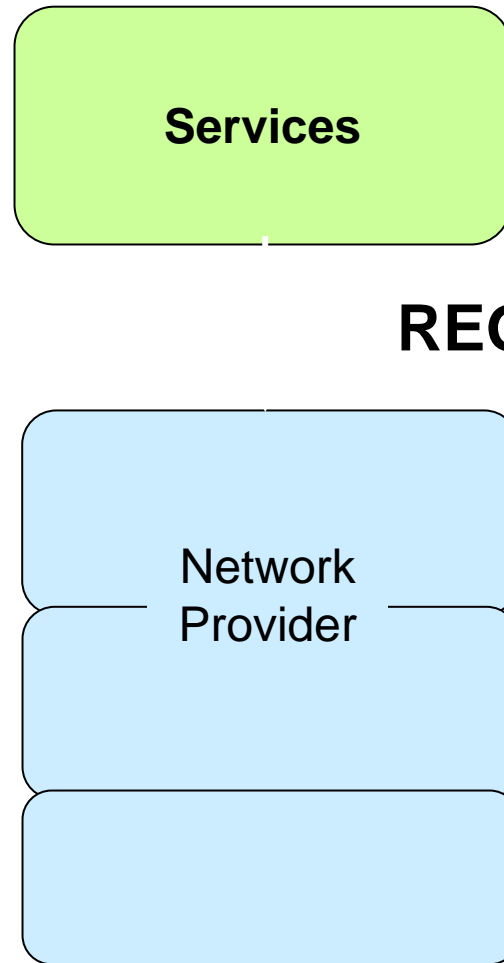
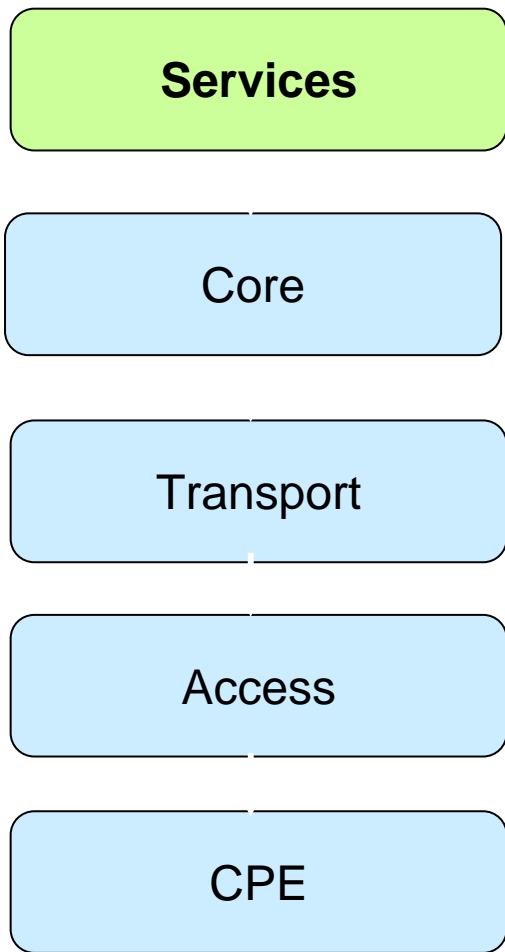
- Denial of Service attacks and overload control
- IP Address and ID management
- Network Address Translation and Firewall Traversal
- Converting between IPv4 and Ipv6for devices
- Lawful Interception
- Quality of Service (QoS) management
- Protocol Translation and Software version adjustments
- Call accounting/Generations of CDRs

Protocols for Interconnection

- SIP/SIP-I: Session Initiation Protocol
- BICC CS-2
- SIGTRAN: Signalling Transport
- MGCF
- RADIUS/DIAMETER

Lawful Interception Requirements

- All communications, Fixed or Mobile, Voice or Multimedia are subject to LI according to security regulations.
- The LI system must create and manage multiple concurrent streams to multiple LEAs
- In case of moving target , LI service should be handed over to one authority to another while crossing LEAs areas of Jurisdiction.
- The Interception must be unobtrusive, without the knowledge of any session participants
- Where network deploys encryption, LI information must be decrypted.



THANK YOU

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