

ACTION

移动通信网络概述

Telecom survey



ACTION

Objectives

After the course the trainees will be able to describe telecommunication

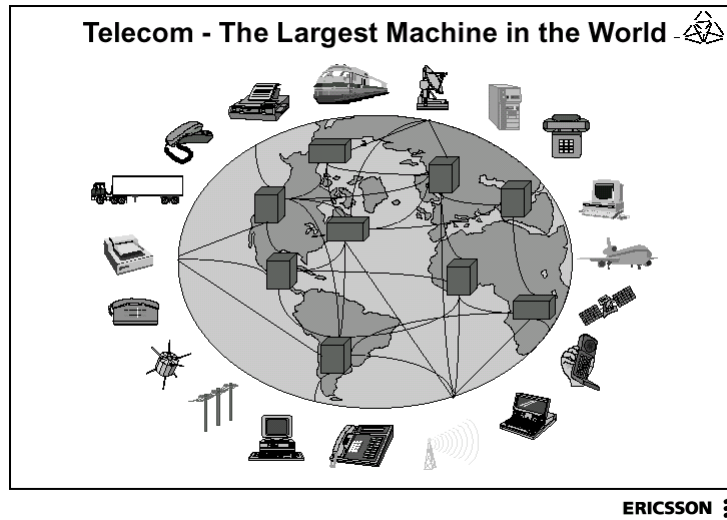
- *Services**
- *Technologies**
- *Networks**

and the relations between them

ACTION
<p data-bbox="325 285 492 330">Schedule</p> <ul data-bbox="325 372 835 643" style="list-style-type: none"><li data-bbox="325 372 678 411">Module 1: Introduction<li data-bbox="325 411 789 450">Module 2: Network & Services<li data-bbox="325 450 835 488">Module 3: Switching & Signalling<li data-bbox="325 488 604 527">Module 4: Access<li data-bbox="325 527 642 566">Module 5: Transport<li data-bbox="325 566 821 604">Module 6: Network Management<li data-bbox="325 604 789 643">Module 7: PSTN&ISDN&PLMN

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<p data-bbox="318 1271 659 1315">INTRODUCTION</p>

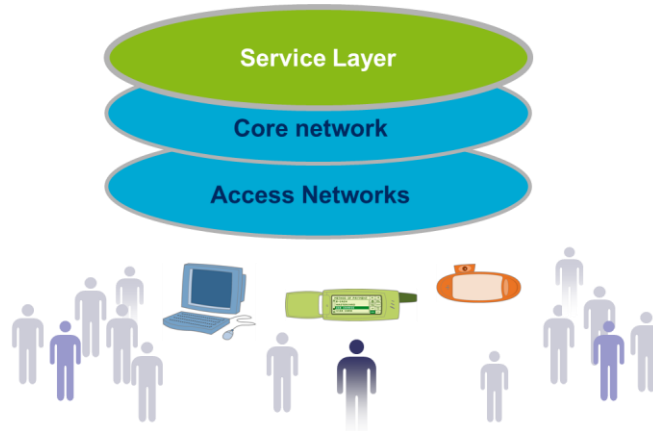
Telecom network



NETWORK AND SERVICES

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Network and services



Horizontal Layering and the Service Layer

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Services

Services Module

Voice/Picture/Data
Integrated Services

Mobility

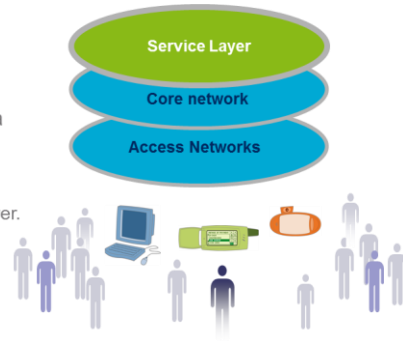
Intelligent Networks



ACTION

What is service networks

- › The **Service Layer** is the architectural layer that covers all functions above the core network.
- › An implemented solution in the Service Layer is a **Service Network**.
 - A Service Network is any collection of products and services that fulfil a business need in the service layer.



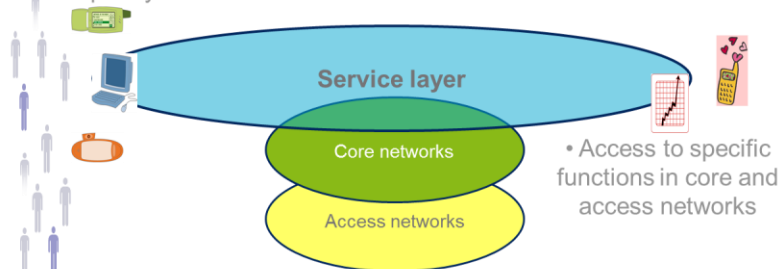
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What service network provides

• End-user services beyond traditional voice telephony

• Support for operators' business processes

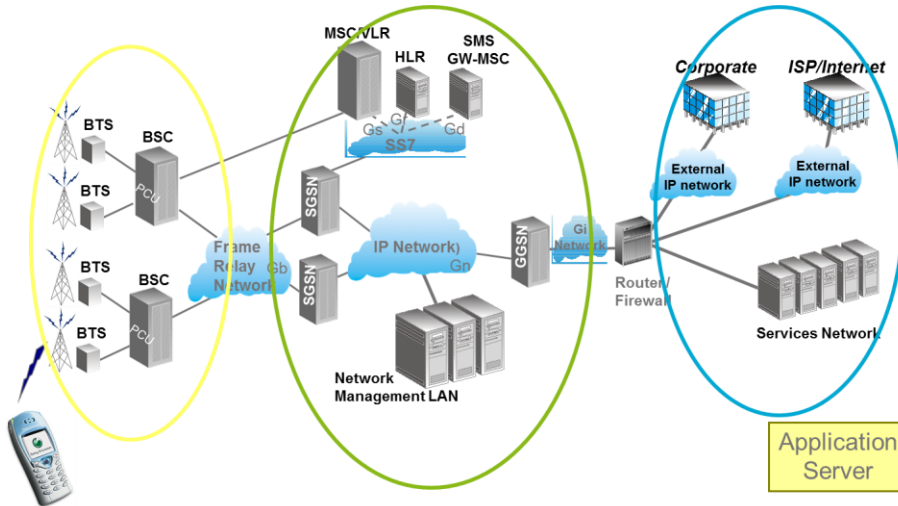
• Services for content & application providers



The service layer gives an end-to-end perspective of offered services, independent of network access

ACTION

For example: major component for the e2e solution

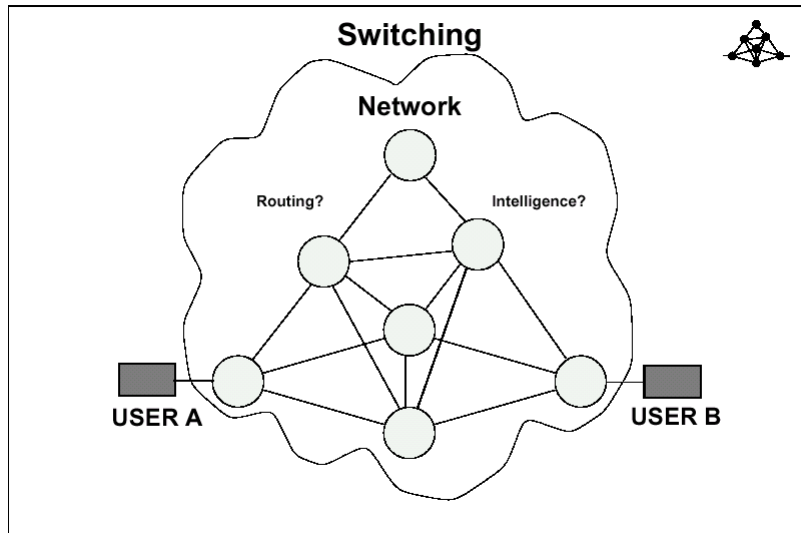


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SWITCHING

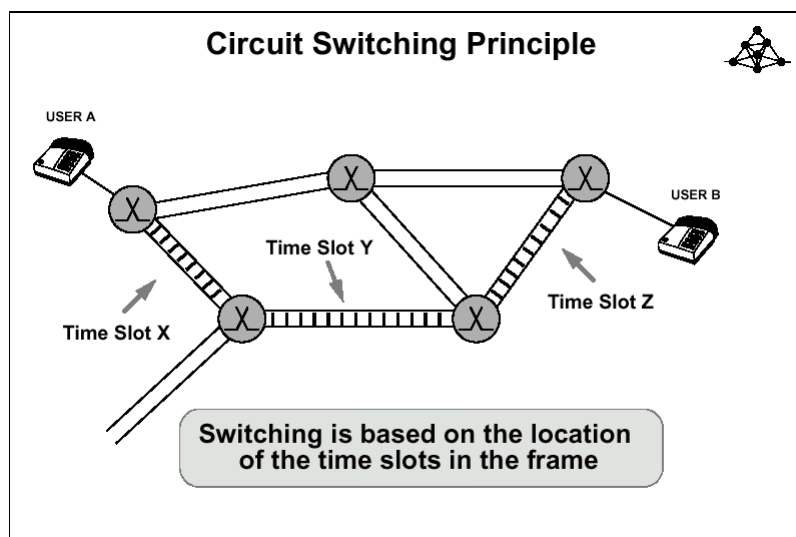
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Switching Principle



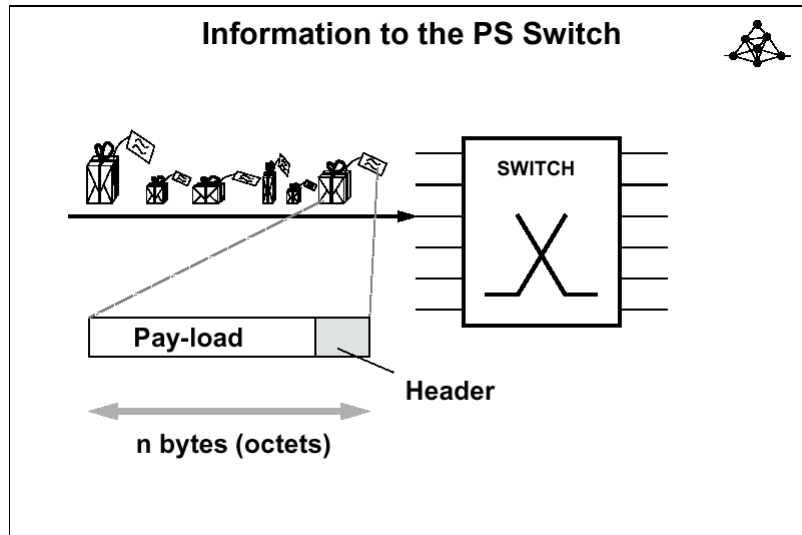
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Circuit switch



ACTION

Packet switch



ACTION

SIGNALLING NETWORK

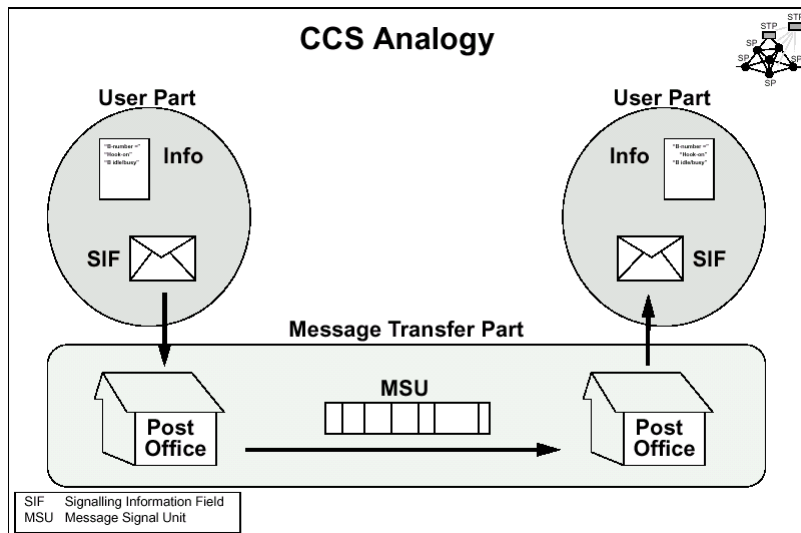
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Signalling

- *General
- *Circuit Switched Connections
 - CAS
 - CCS

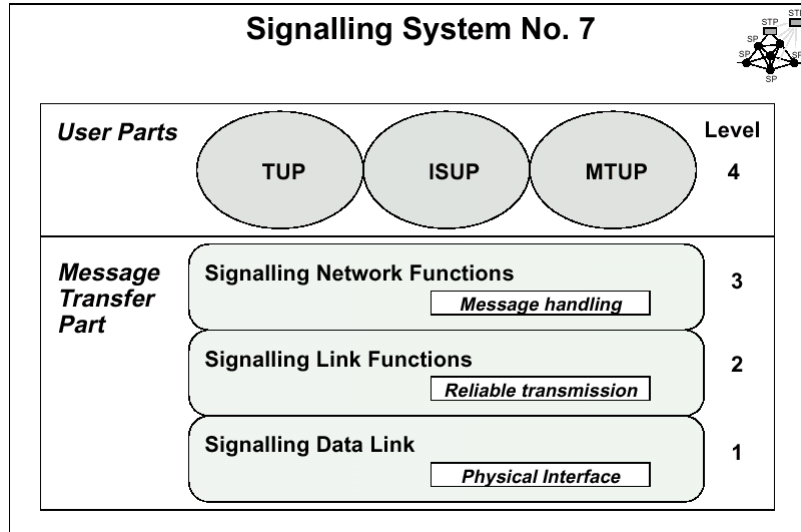
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CCS Analogy



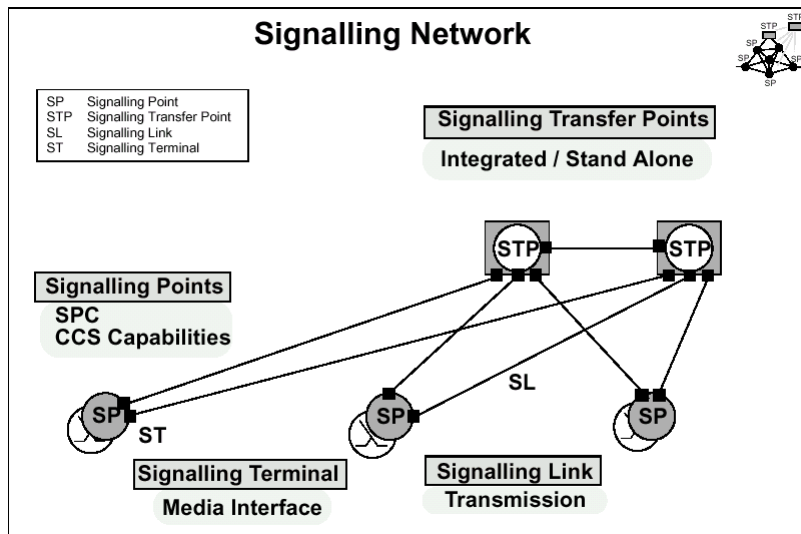
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Signalling System No. 7



ACTION

Signalling Network

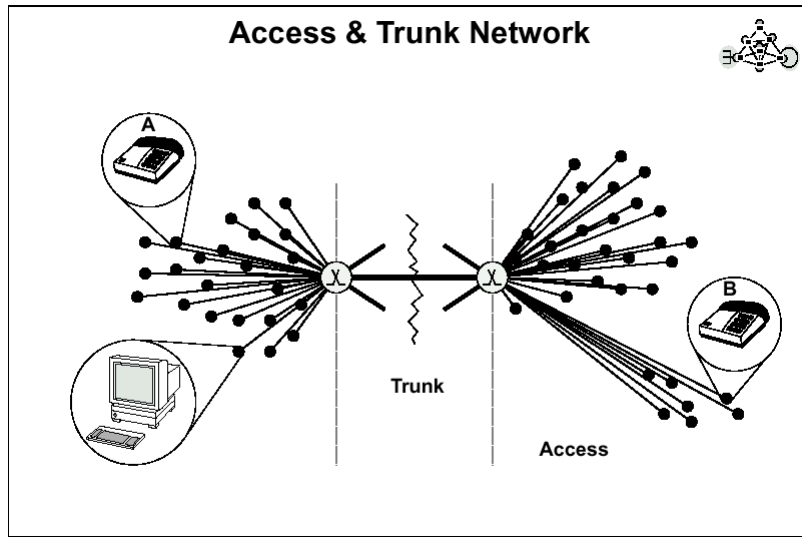


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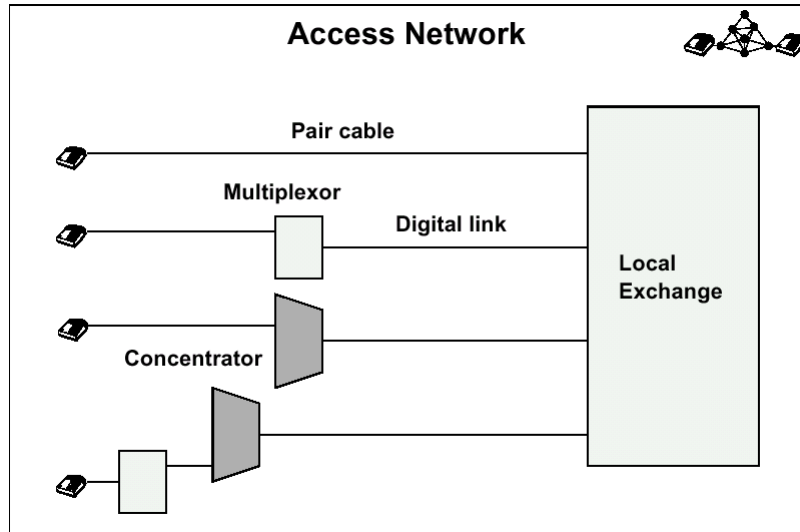
ACCESS NETWORK

ACTION

Access & Trunk Network

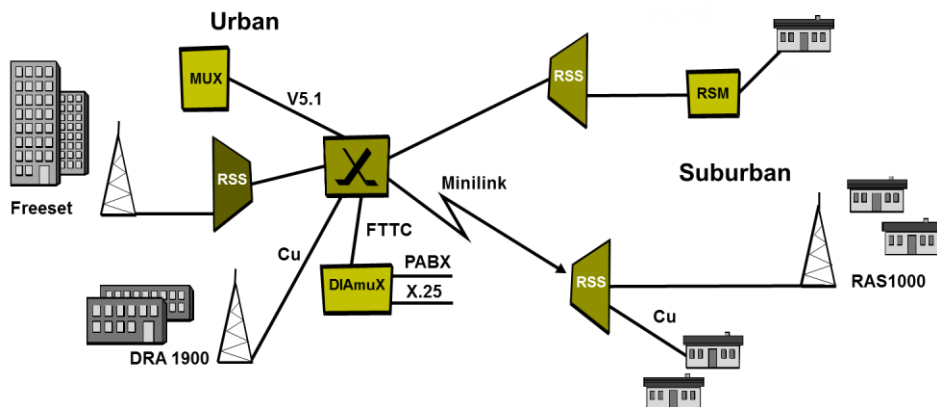


ACTION



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Access to exchange

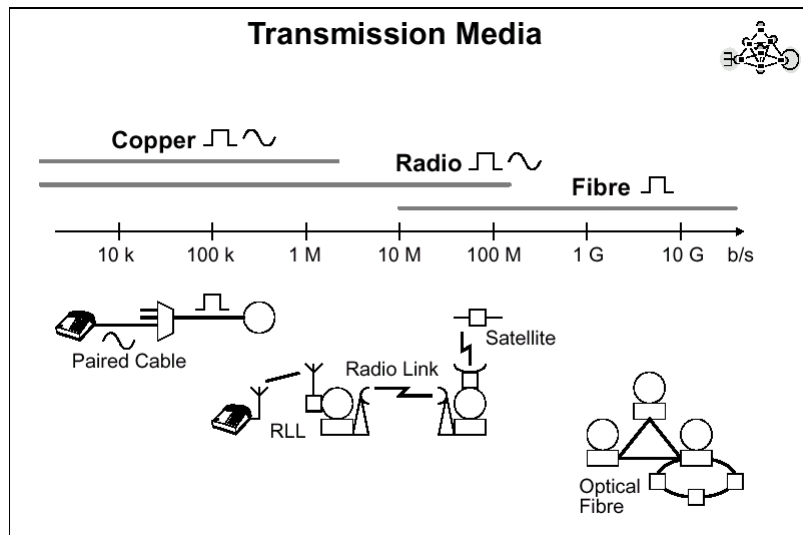


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TRANSPORT NETWORKS

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Transmission Media



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PDH - Plesiochronous Digital Hierarchy



D5	565 Mbit/s	7680 ch
D4	140 Mbit/s	1920 ch
D3	34 Mbit/s	480 ch
D2	8 Mbit/s	120 ch
D1	2 Mbit/s	30 ch
	64 kbit/s	1 ch

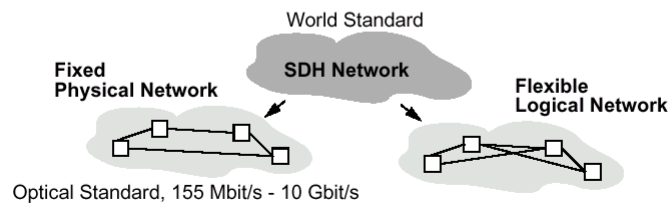
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SDH - Synchronous Digital Hierarchy

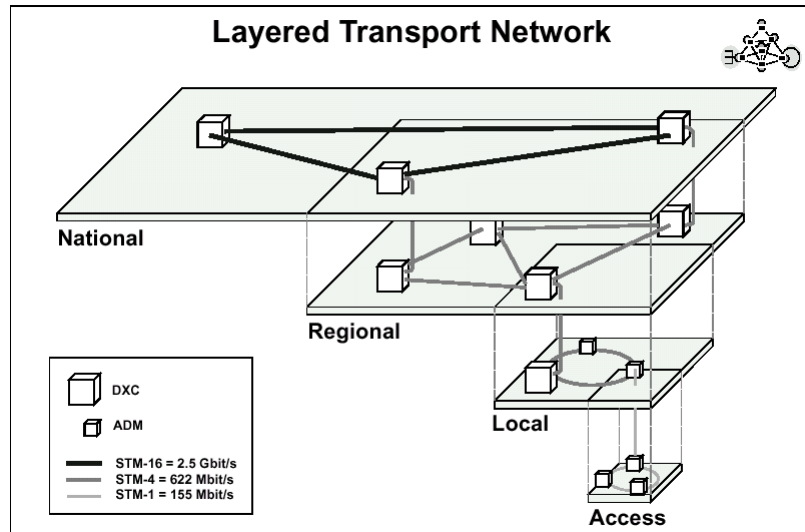


Operator Benefits

\$	Remote Control	\$
	Increase Utilization	
	Enhance Network Structure	
	Reduce Network Scheduling Time	



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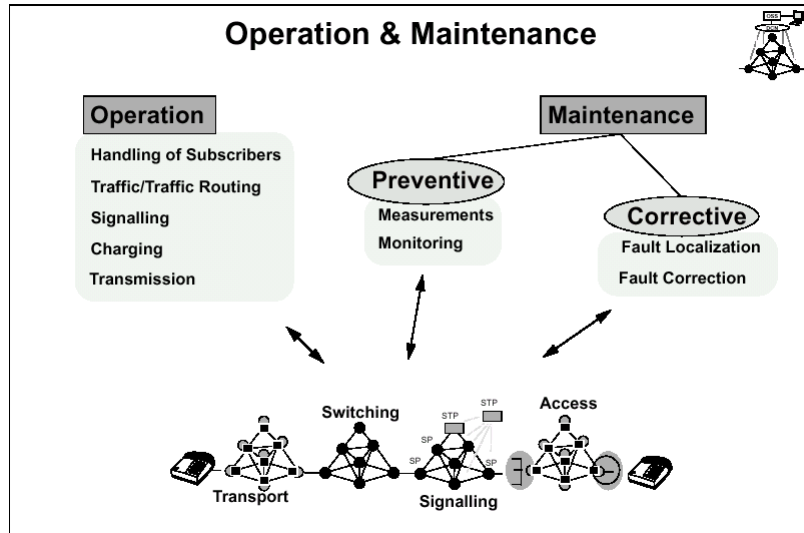


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NETWORK MANAGEMENT

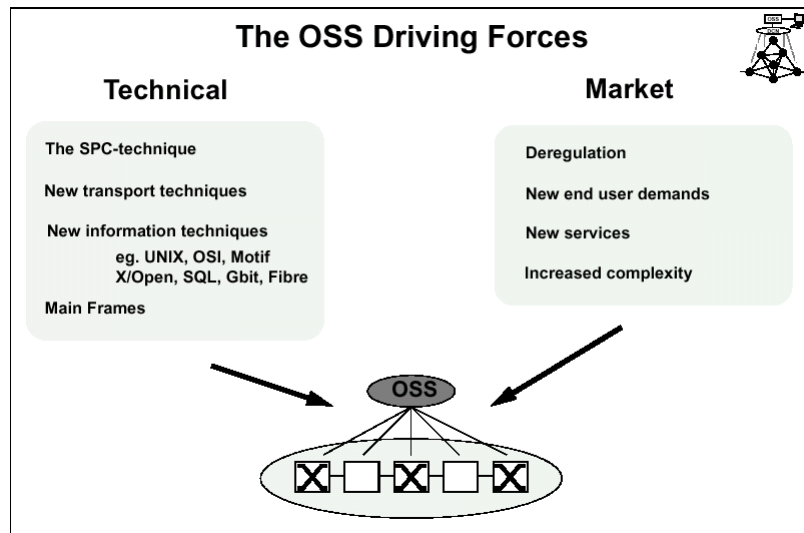
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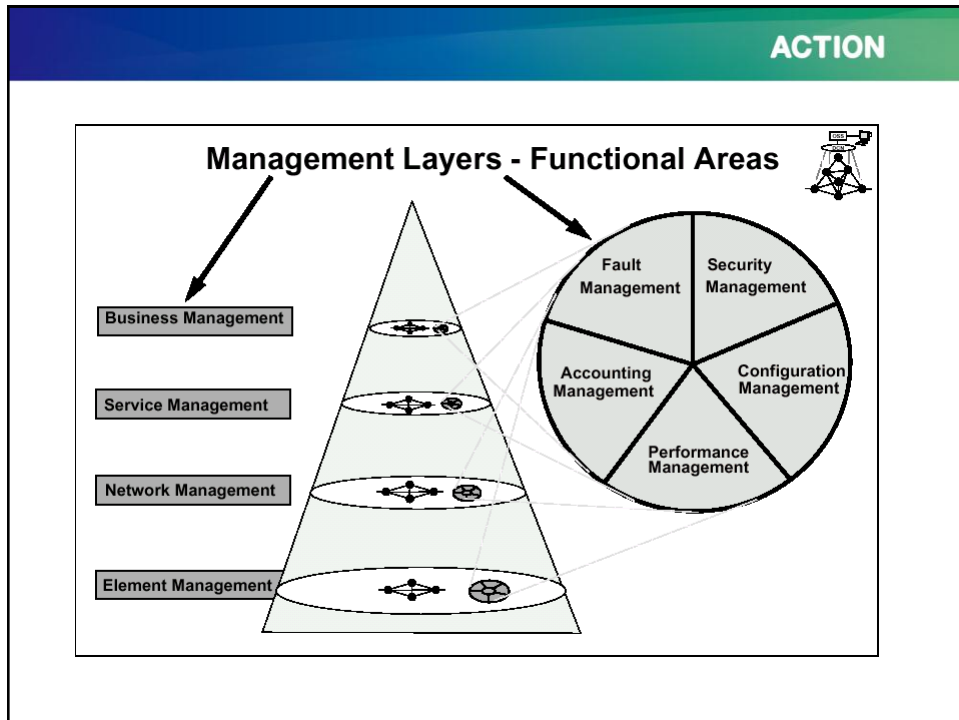
Operation & Maintenance



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The OSS Driving Forces



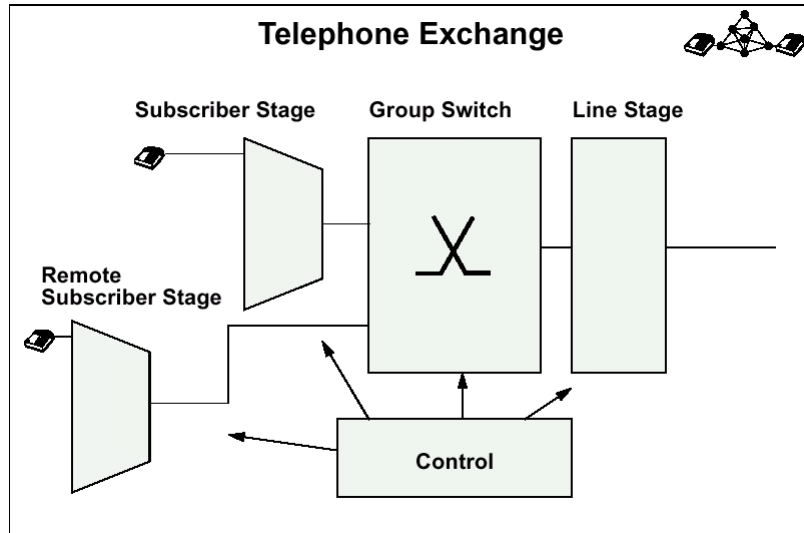


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PSTN & ISDN & PLMN

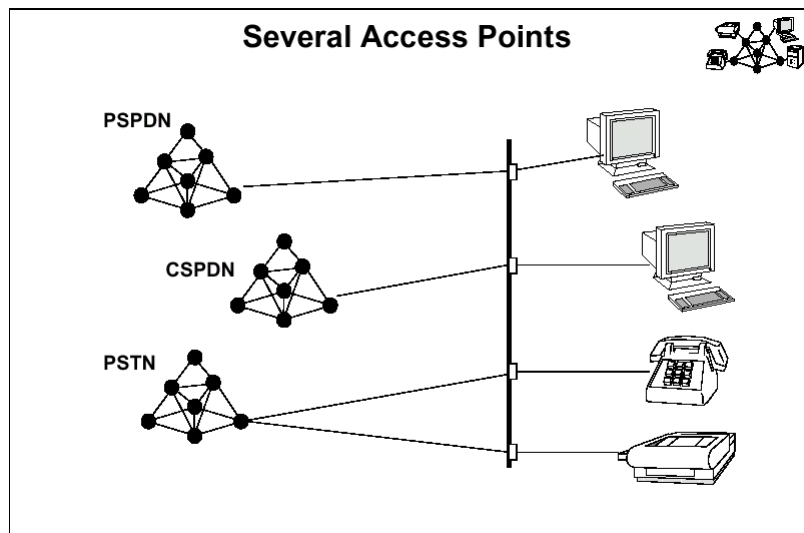
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PSTN Public Switched Telephone Network



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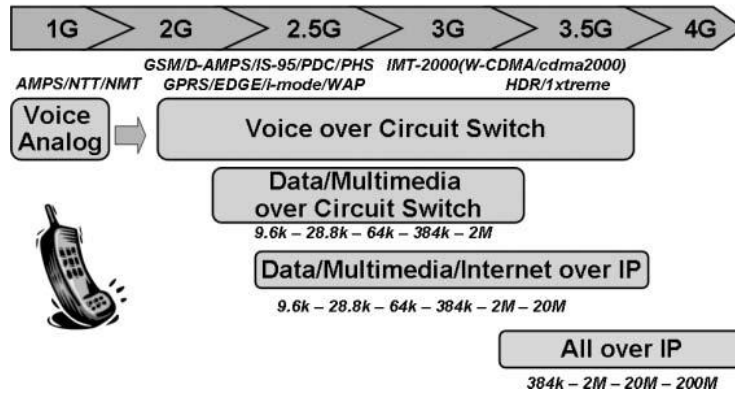
ISDN Integrated Services Digital Network



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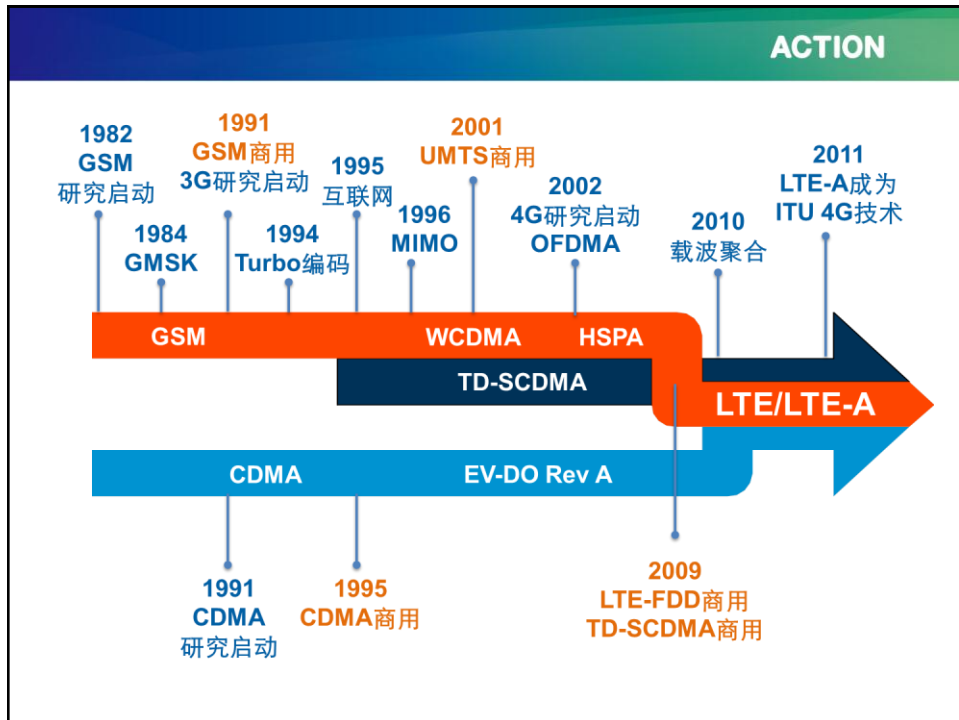
PLMN Public Land Mobile Network)

Application and Transport Technology Trends



ACTION

LET US TAKE A BREAK



ACTION

无线电电磁波的物理模型

- 无线电电磁波的能量分为电场能量和磁场能量
- 电场能量和磁场能量均以振动的形式传播
- 电振动和磁振动的方向相互垂直
- 电振动和磁振动的频率相同，即电磁波的频率

The diagram shows a sinusoidal wave propagating to the right, indicated by a white arrow labeled "传播方向". Two perpendicular vibrations are shown: "电振动" (Electric vibration) represented by a red sine wave and "磁振动" (Magnetic vibration) represented by a blue sine wave. The vibrations are perpendicular to each other and to the direction of propagation.

电振动、磁振动与波的传播方向三者相互垂直

ACTION

载波 (Carrier)

- 承载特定信息的无线电磁波
 - 特定的幅度
 - 特定的频率
 - 特定的相位

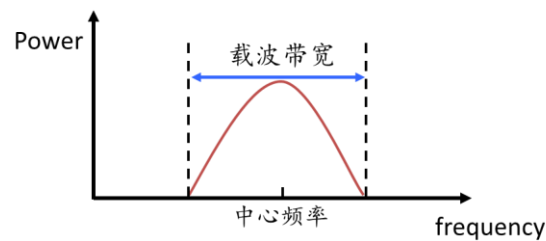
载波的强度 (Carrier Strength)

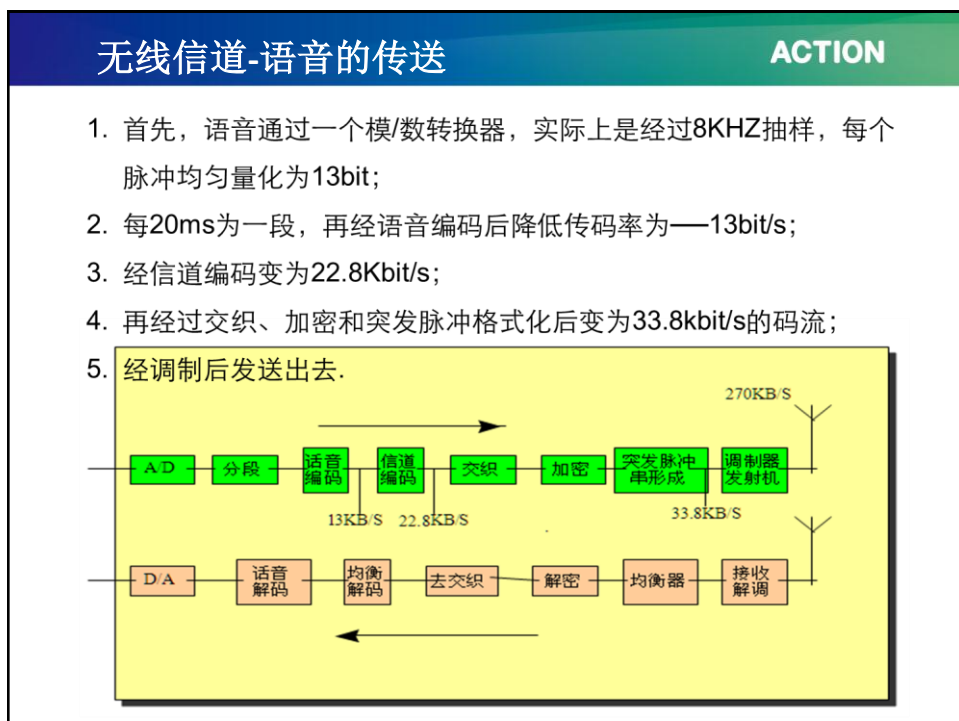
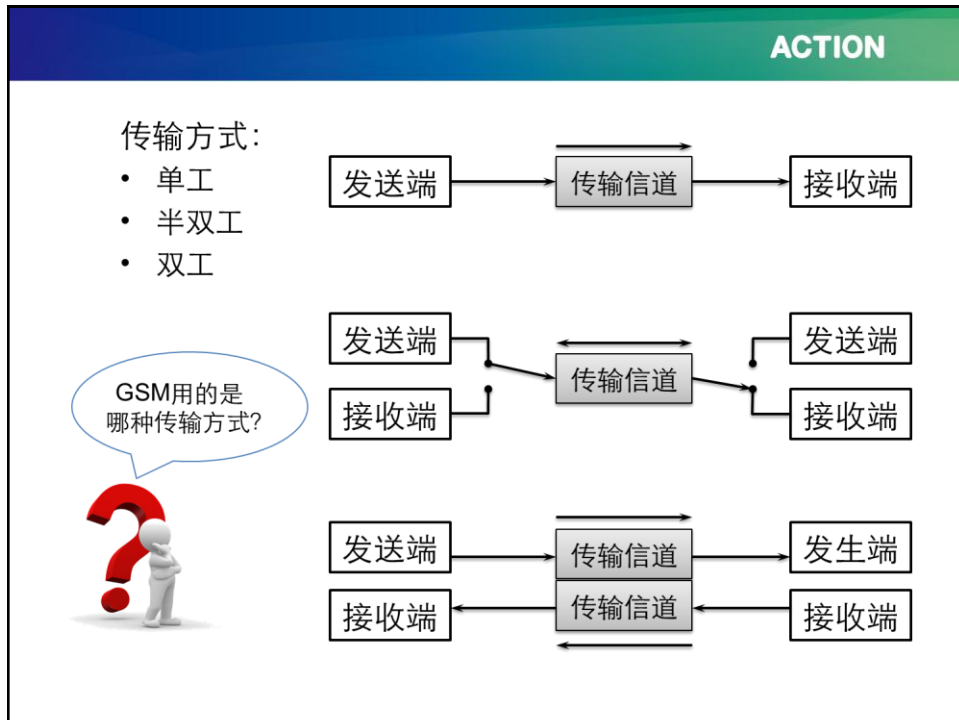
- 载波强度的线性单位: W (瓦)
- 载波的强度也被称为功率
- 载波强度的对数单位: dBm (分贝毫瓦)
- 换算方法示例: $10\text{W} \rightarrow ? \text{dBm}$
 - Step 1: $10\text{W} = 10 \times 10^3\text{mW}$
 - Step 2: $10\log(10 \times 10^3\text{mW}/1\text{mW}) = 40\text{dBm}$
- 换算方法练习
 - $1\text{mW} \rightarrow ? \text{dBm}$
 - $0.5\text{mW} \rightarrow ? \text{dBm}$

ACTION

载波带宽 (Carrier Bandwidth)

- 无线电磁波在频率域的宽度
- 载波带宽的单位: Hz (赫兹)
- 用载波的“中心频率”来表示载波的频率
- 载波中心频率处的功率最高

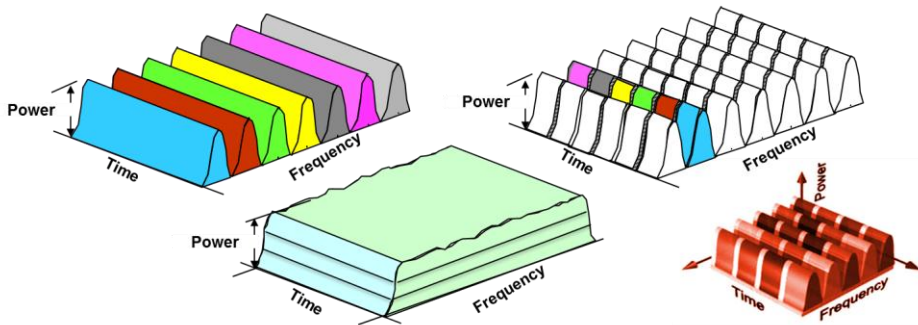




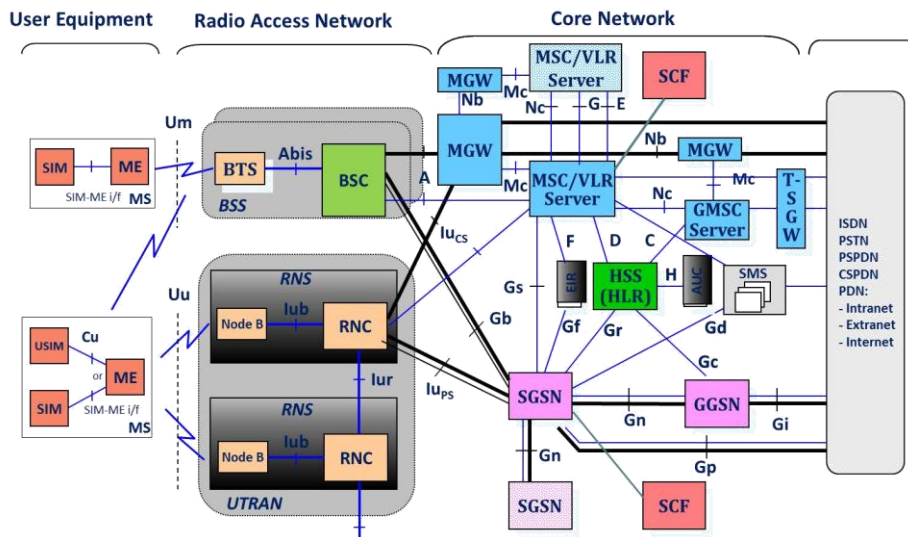
ACTION

多址方式

- Frequency Division Multiple Access (FDMA)频分多址
- Time Division Multiple Access (TDMA)时分多址
- Code Division Multiple Access (CDMA) 码分多址
- Orthogonal Frequency Division Multiple Access(OFDMA)
正交频分多址



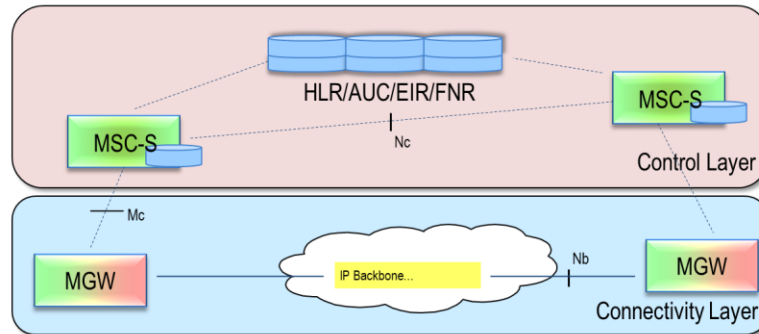
ACTION



ACTION

核心网电路域

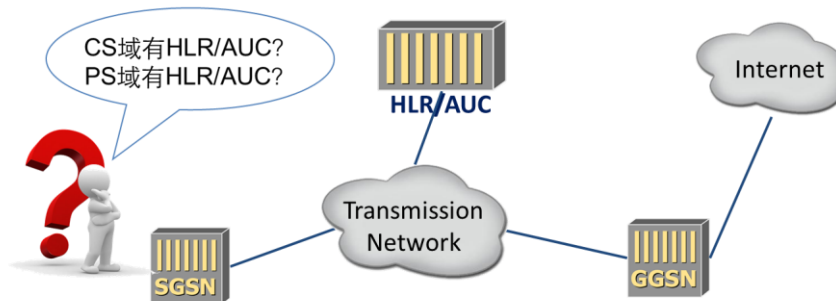
- 主要完成对呼叫、短信、传真等传统语音业务的控制，以及对移动用户的管理
- CS域采用了MSS移动软交换分层结构，分为：
 - 控制层，主要由MSC-S，HLR/AUC/EIR/FNR等组成
 - 连接层，主要由MGW组成

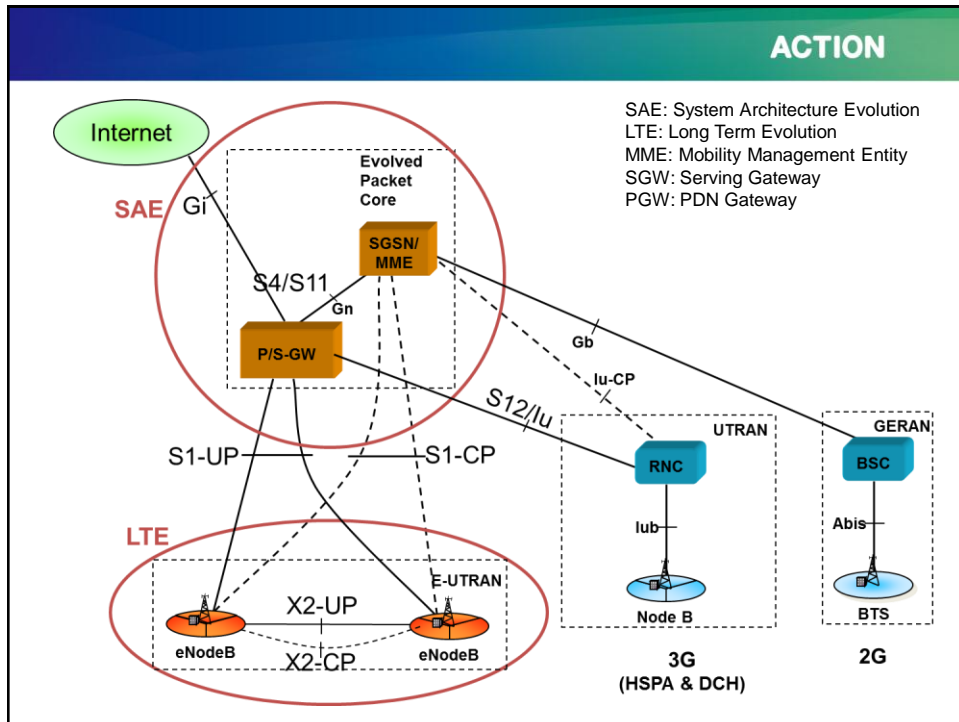


ACTION

核心网分组域

- 提供分组数据业务，实现移动用户对互联网的访问，同时完成相应的移动性管理等功能；
- PS域主要由SGSN、GGSN组成；





上善若水
大爱可生