E1-E2 CM
MOBILE INTELLIGENT NETWORK

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AGENDA

- Under Standing IN & MIN
- Block diagram and parts of MIN
- Functional entities in IN and there uses
- CAMEL
- Implementation of IN in mobile domain
- Conclusion

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Intelligent Network Principle

- IN is an architectural concept for the operation and provision of new services quickly, flexibly, economically and efficiently.
- The basic principle of IN is the separation of service and switch.

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Intelligent Network Principle

- The IN is an extension to the existing telephone network.
- The network is organised so that the telephone calls received by the IN are interrupted to query a database in order to determine what to do with the call.
- The call can then be re-routed based on a number of pre-defined conditions.
Users & Providers of IN Services

- **Network Provider** - The company that is responsible for the telephony network planning and maintenance.

- **Service Provider** - The company or institution that purchases IN services from the network provider and provides it to Service subscribers. It is the organisation which creates, manages and markets the service.

- **Service subscriber** - The company, institution or individual that purchases IN services from the Service provider. One who subscribes for the service and registers with the service provider. For some Services, such as Calling card, the service subscriber is an individual. For others such as Televoting or VPN it is an organization.
- Calling Subscriber-A Party or Calling party, the person who dials IN number
- Called Subscriber- B party or Called Party, the person who answers the IN call.

Calling and called party are collectively referred to as users

User- One who uses the service. He does NOT require to subscribe to the service

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Advantages to Network Provider

- Additional network traffic-IN services stimulate the use of telephone network for new applications.
- Higher call completion rates-IN services target calls to destinations where they are most likely to be answered.
Advantages to Service Provider

- Flexible and rapid deployment of new services.
- Wide range of services.
- New tariffed features.
Advantages to Service Subscriber

- Flexible charging.
- Call queueing.
- Flexibility in who maintains the database.
Advantages to IN user

- Ease of access.
- Facilities of advanced services.
Core Concept of IN

Separating Service Control Function from Switching System

Service Management System

Data Network

SCP1
SCP2

Intelligent Layer

Signaling Layer

CCS7

Transmission/Switching Layer

SSP1
SSP2
SSP3
SSP4

SCP :
Service Control Point
SSP :
Service Switching Point

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IN Service Process

Components:

SSP、SCP、SDP、SMP、SCE、SMAP

Implementation process of IN services

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IN Conceptual Model

- **Service Plane**
  - Service from user view
  - Reusable unit of functionality (Numbering, Charging, UI, Restriction etc)

- **Global Functional Plane**
  - Service Provider’s point of view
  - SIBs (BCP, Charge, Translate, Screen etc)

- **Distributed Functional Plane**
  - Realistic View of Network (FEs: CCF, SSF, SCF, SDF, SMF & SRF)
  - SDLs (Specification & Development Language) & MSC (Message Sequence Charts)
  - DPs of O-BCSM & T-BCSM

- **Physical Plane**
  - Physical Nodes (SCP, SSP, SMP, SDP, SRP/IP)
CCAF: Call Control Access Function
CCF: Call Control Function
SSF: Service Switching Function
SCF: Service Control Function
SRF: Special Resource Function
SDP: Service Data Function
SCEF: Service Creation Environment Function
SMP: Service Management Function

Distributed Functional Plane

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**Physical Plane**

Physical Plane contains the PEs and the interfaces between PEs

- **SCE** Service Creation Environment
- **SMP** Service Management Point
- **SCP** Service Control Point
- **SSP** Service Switching Point
- **IP** Intelligent Peripheral
- **SMAP** Service Management Access Point

Network maintenance Center

Settlement Center

PSPDN

SCP

SMS

STP

CCS7

PSTN/ISDN/Mobile

PABX

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Entities in the Functional Model

- **CCF (call control function)** - this provides the basic call and connection handling in the exchange. It establishes, manipulates and releases the call.

- **SSF (Service switching function)** - It enables interaction between CCF and SCF. It recognizes service control triggers, through which it recognizes IN calls. It manages the signaling between the CCF & SCF.

- **SCF (Service Control function)** - Directs call control functions during the processing of an IN call. It contains the IN service call processing logic stored in the subscriber databases which specifies how to handle an IN service request. It interacts with the SSF and the SRF to obtain information required to process an IN call. Sometimes the SCF is split into two functional entities
  - SDF (Service Data Function) - the database
  - SCF (Service Control Function) – Call processing and other logic

Other functions are
- Collection of traffic and network measurements and sending to SMF
- Sending of status and service maintenance messages to the SMF
- Network management controls
- Sending of Billing Information to the SSF

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Entities in the Functional Model

- **SRF (Specialized Resource Function)** – It is used whenever an IN call requires direct interaction with the calling party in the speech path. It contains the logic and processing capability to send, receive and convert information.
  - It has the following functions:
    - Play Announcement
    - Collect digit
    - Voice recognition
    - Voice Back

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Entities in the Functional Model

- SCEF (Service creation Environment Function)— This function enables service developers to develop service logic, create and modify network databases
- Downloading of service logic to the SMS
- The purpose of SCEF is to create Service Packages (SPs). An SP is a container for one or more IN Services
- It contains
  - Service logic
  - Service data and service data schema
  - Specification of which data and statistics to collect during service execution

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Entities in the Functional Model

- SMF (Service Management Function) – This function is responsible for provisioning and managing services created by the SCEF and downloading services & service related data to the SCF equipment
- Applying changes to the global (service wide) or subscriber data
- Downloading service logic onto the SCF
- Collection of service subscription measurements
- Receiving & logging unsolicited status and service management messages from SCF
- Producing reports
- Service data audits

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The Functional Model defines the entities in terms of functions and not in terms of physical network elements. The network elements which correspond to different functional entities are:

- SCF  SCP (Service Control Point)
- SRF  IP (Intelligent Peripheral)
- CCF/SCF  SSP (Service Switching Point)
- SCEF  SCE (Service Creation Environment)
- SMF  SMS (Service Management System)

More than one of these functional entities may be implemented on one physical network element.
IN Architecture

SMP - Service Management Point
SCP - Service Control Point
SSP - Service Switching Point
IP - Intelligent Peripheral

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IN Network Elements

--- CCS 7 Signaling Links

--- Voice Trunk

STP

SSP

SSP

IP

Public Telephone Network

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SSP - Service Switching Point

- The subscriber calls are routed to SSP through the voice path
- SSP has the capability to interact with the database
- Mostly SSP is a software upgrade of the existing exchange

IN Architecture

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IN Architecture Elements

Service Switching Point (SSP)

- Major function of the SSP is to detect events during call processing, called triggers, that indicate an IN call event
- After triggering, the SSP suspends call processing and starts a series of transactions with the SCP to determine the handling of the call
- Supervises the length of the call

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SCP- Service Control Point

- This is a computer database
- SCP has the service logic and subscriber related data
- SCP is connected to SSP by CCS7

IN Architecture
SMP- Service Management Point
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Service Control Point (SCP)

Contains the IN service logic.

Control of call handling

- Call redirection guidance (Free phone)
- call duration
- Real time charging
- announcement control

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- Services are created, modified and tested in SMP
- Service logic is downloaded from SMP to SCP for execution
- Call statistics are sent from SCP to SMP for post processing

SCP and SMP are connected by X.25 for BSNL internal circulation only
IN Call Example

1. Called No 18001801234
2. Request for information
3. Re-routing information
4. Re-routing information
5. Called No 18001801234
6. PSTN No 022-2245678

Calling Subscriber

Service Subscriber

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IN Services

• IN is flexible network for designing, implementing and using services.

• Each service consists of one or more service features. A Service feature is a unit of functionality for e.g. Routing by time of day or call queuing.

• A caller normally accesses a service by dialing a Service Access Code (SAC).
IN Services

• Advanced routing services
• Single destination service
• Account card calling service
• Televoting service
• Virtual Private Network Service

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Advanced routing services

- Freephone Service
- Split charging service
- Premium charging service
- Universal access service

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IN in Mobile Network

• Mobile networks are Intelligent Network structured networks, they have centralized databases (in GSM HLR, VLR) which correspond to IN SCP. GSM also supplies many of the supplementary services that can be supported on fixed networks by IN solutions.

• IN in Mobile networks is a subset of Landline IN, but customized to meet the special requirements of Mobile services, hence named Customized Application for Mobile Enhanced Logic (CAMEL).

• Mobile services has some unique features like handover, location update, roaming etc.
Principle of IN

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