



# Signaling in Communication

## Objectives



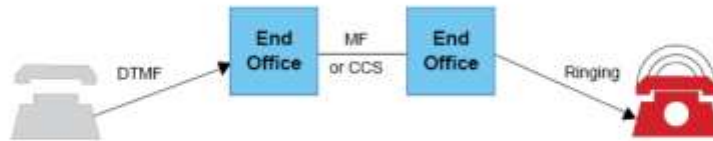
- At the end of this session, you will be able to:
  - Understand the need of signaling and its categorization
  - Understand the types of signaling used in PSTN: CAS, CCS
  - Understand the need of CCS over CAS
  - Understand common signaling standard called 'SS7 signaling system' from a perspective of features and advantages
  - Understand SS7 network architectural components such as SSP, SCP and STP and their roles
  - Understand PSTN call flow with SS7 network

## Agenda



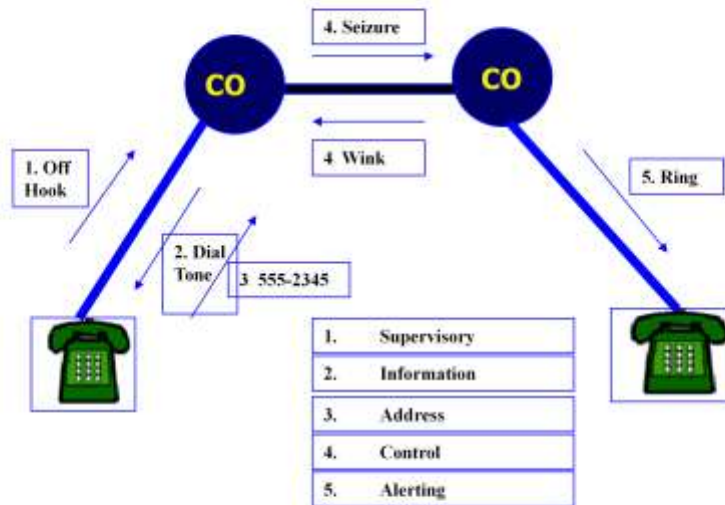
- Signaling classification
- Channel Associated Signaling [CAS]
- Common Channel Signaling [CCS]
- SS7 signaling network features
- SS7 signaling network architecture
- PSTN call flow using SS7 network

## Signaling



- Request service from the central office switch
- Provide central office switch with the information necessary to route a telephone call
- Alert destination address of incoming call
- Provide status information and call supervision for billing.
- Manage network lines/trunks

## Signaling Categories



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**Supervisory** Signals are from subscriber to initiate or terminate the call or to invoke the facility(offhook onhook)

**Information** Signal is from exchange to subscriber indicating the progress of the call (tones)

**Address** Signal from subscriber to exchange or between the exchanges gives the called party number of the facility (destination)

**Control** Signal between switches to initiate or terminate the call.

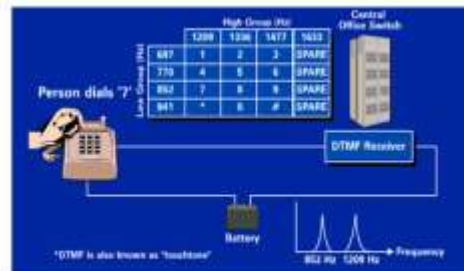
**Alerting** Signal from switch to subscriber indicating the arrival of the call.

# Dial Methodologies

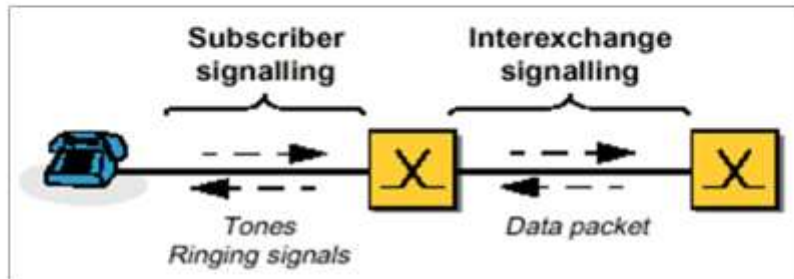


Pulse Dialing

Tone Dialing



Dial tone , ring tone , off hook , on hook are couple of other examples of subscriber local loop signalling.

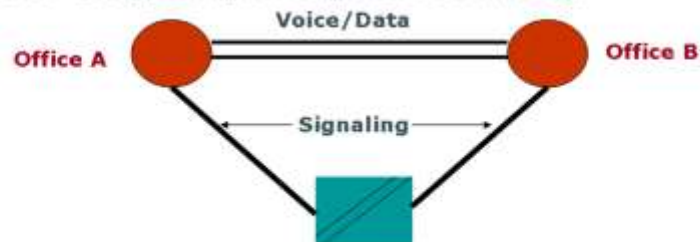


## Types of Signaling used in PSTN

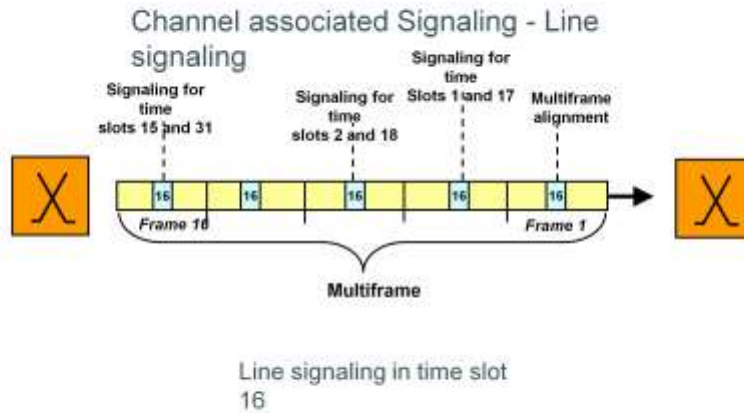
- **Conventional Circuit Associated Signaling(CAS)**  
(Voice & Signaling share the same path)



- **Common Channel Signaling – CCS**  
(Voice & Signaling on separate facilities)







### Signaling in circuit-switched networks

- Old signaling systems may also use traffic channels for signaling

Signalling is slow

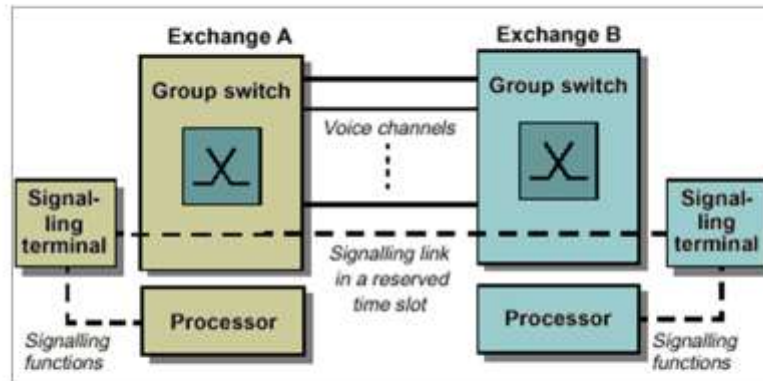
Information capacity is limited and used inefficiently

Limited or no capacity for non call-related information

Applies to telephony only - cannot cover new services

Signalling capacity reserved for the slot

## Common Channel Signaling [CCS]

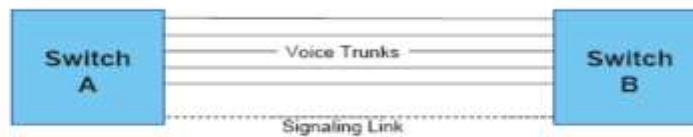


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The most modern form of interexchange signalling on circuit-switched connections is common channel signalling (CCS). *SS7, which belongs to this category, is predominant in modern digital networks.* CCS requires a separate signalling network; that is, the signals have a bearer service of their own. Because the signalling network executes this bearer service, it can be accessed by users other than the PSTN. Other typical users are ISDN and the PLMN.

## CCS/SS7 FEATURES/Advantages



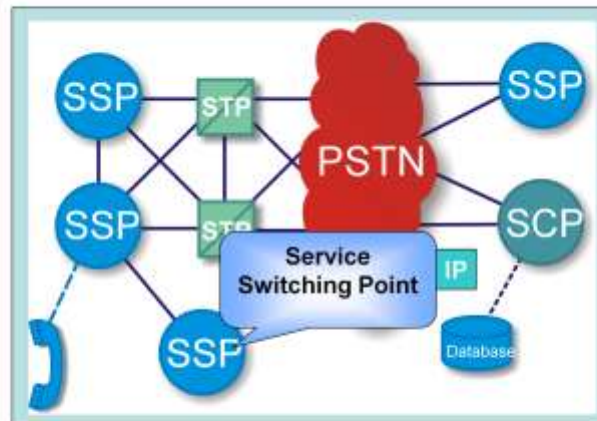
- **Features:**

- SS7 network is a packet switched network
- Voice channel is dedicated for voice and information signals such as dial tones and announcement
- Signaling channels are on separate network
- Signaling channels carry control, address and supervisory signals
- Signaling network is common to all voice channels

- **Advantages:**

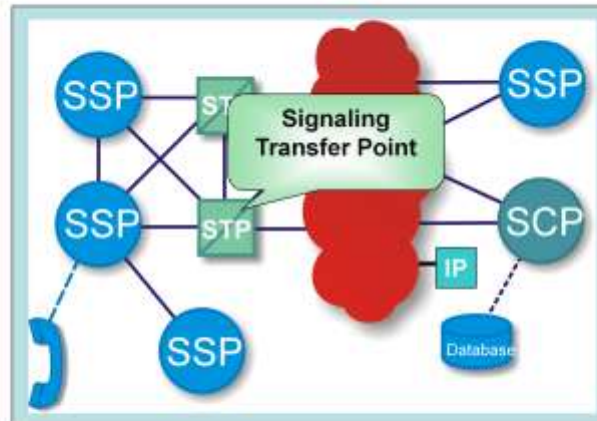
- Greater volume of signaling information with added flexibility
- Reduction in call set up times
- More efficient use of trunks
- Reduction in fraud rate due to separation of signaling and voice path
- Facilitation of additional (transaction based) services

## SS7 Network Elements

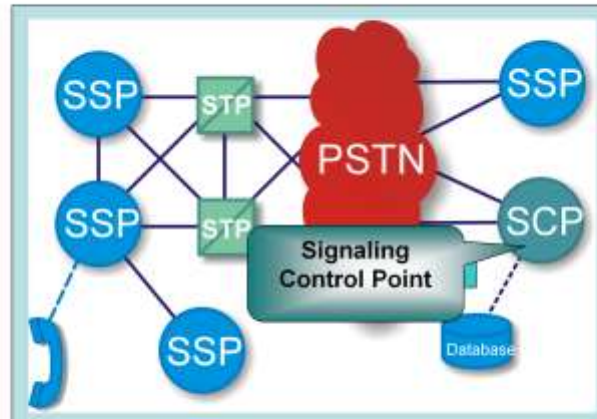


The Service Switching point or the SSP are telecom switches equipped with SS7-capable software. They are used to originate, terminate or switch calls

## SS7 Network Elements



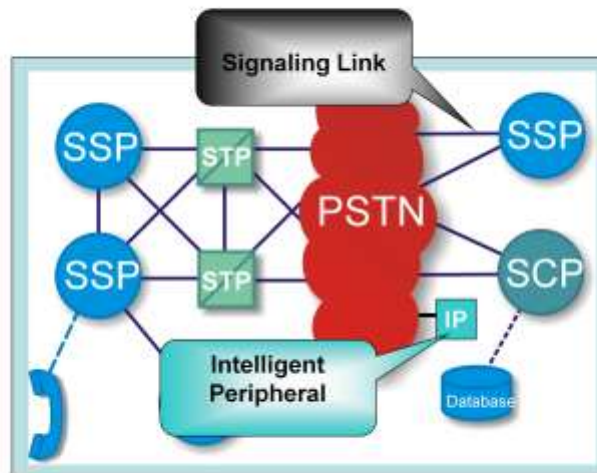
The Signal Transfer Points or the STP receive and route the incoming signaling messages towards the proper destination. They also perform specialized and complex routing functions



The Signaling Control Point or the SCP is a specialized node in the network that hosts the software and the data for services like

- 1) 1-800 numbers i.e. toll free numbers
- 2) Local number portability , calling cards , prepaid etc. Note that a database is associated with SCP

## SS7 Network Elements

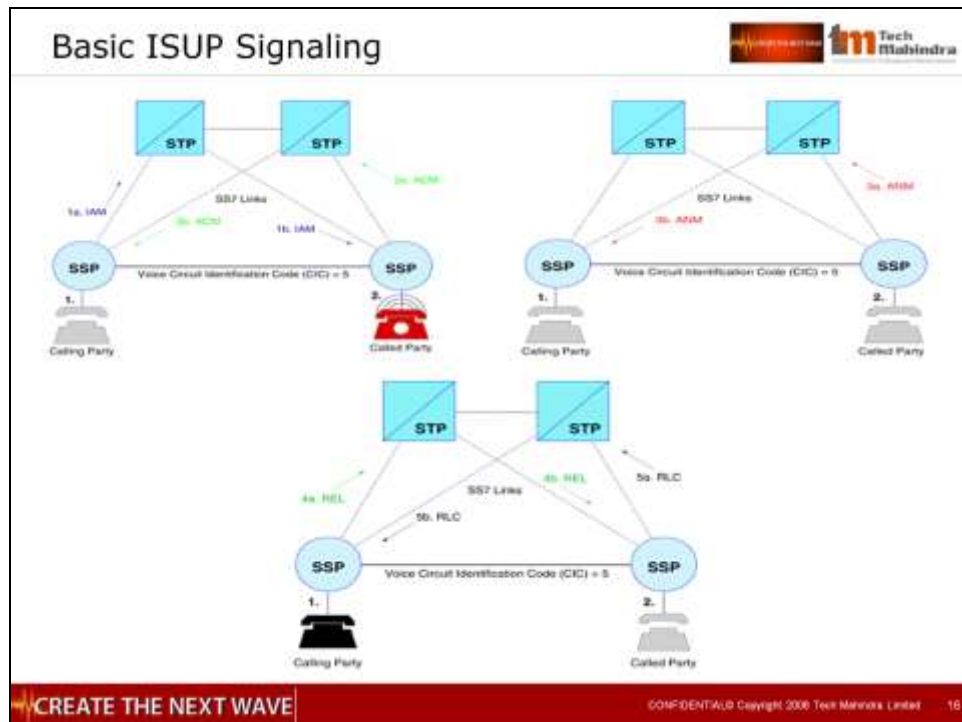


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The Intelligent Peripheral or the IP is the node that provides the IVR (interactive voice resource) functionalities. It plays announcements and prompts and collects user information.

All the nodes in an SS7 network are connected via signaling data links with varied specification.



Sequence of call set up.

1. IAM = Initial Address message .required destination number is sent to destination SSP via its own STP by reserving a Trunk (Ckt no5 in this case).
  2. Upon confirming the required number is available the destination side SSP2 confirms to calling SSP1 by a ACM=Address complete message through its own associated STP, by reserving the Trunk ckt 5..
- Called party fed Ring by SSP2 while SSP1 after receiving ACM feeds Ring back tone (RBT) to Calling party.
3. When called subscriber Answers by lifting his hand set SSP2 sends ANM=Answer Message to SSP1 & removes ring to called subscriber. SSP2 upon receiving ANM removes the RBT to caller & now both parties will be connected by SSP1/SSP2 on Ckt 5.
  4. When either party disconnects (in figure party1 disconnects) a REL = Release message is sent to destination SSP (SSP2) asking for release of call by disconnecting Ckt 5.
  5. SSP2 after disconnection sends back a RLC =Release complete message to SSP 1 Confirming release of Circuit.
- Ckt 5 is now available for other calls



## Summary



- In this session, we have learned:
  - Need of signaling and its categorization
  - Types of signaling used in PSTN: CAS, CCS
  - CCS v/s CAS
  - SS7 CCS: Features and advantages
  - SS7 network architectural components such as SSP, SCP and STP and their role in networking
  - PSTN telephone call flow using SS7 network



Thank You