COMVERSE UNIVERSITY

Signaling System #7 (SS7) Overview

Comverse ONE

Lesson Objectives

By the end of this lesson you will be able to:

- Describe the Signaling concept in telephony
- List the different entities of a signaling network
- List the protocols used for signaling

Agenda

Signaling and Comverse ONE

Signaling Role

Signaling System Architecture

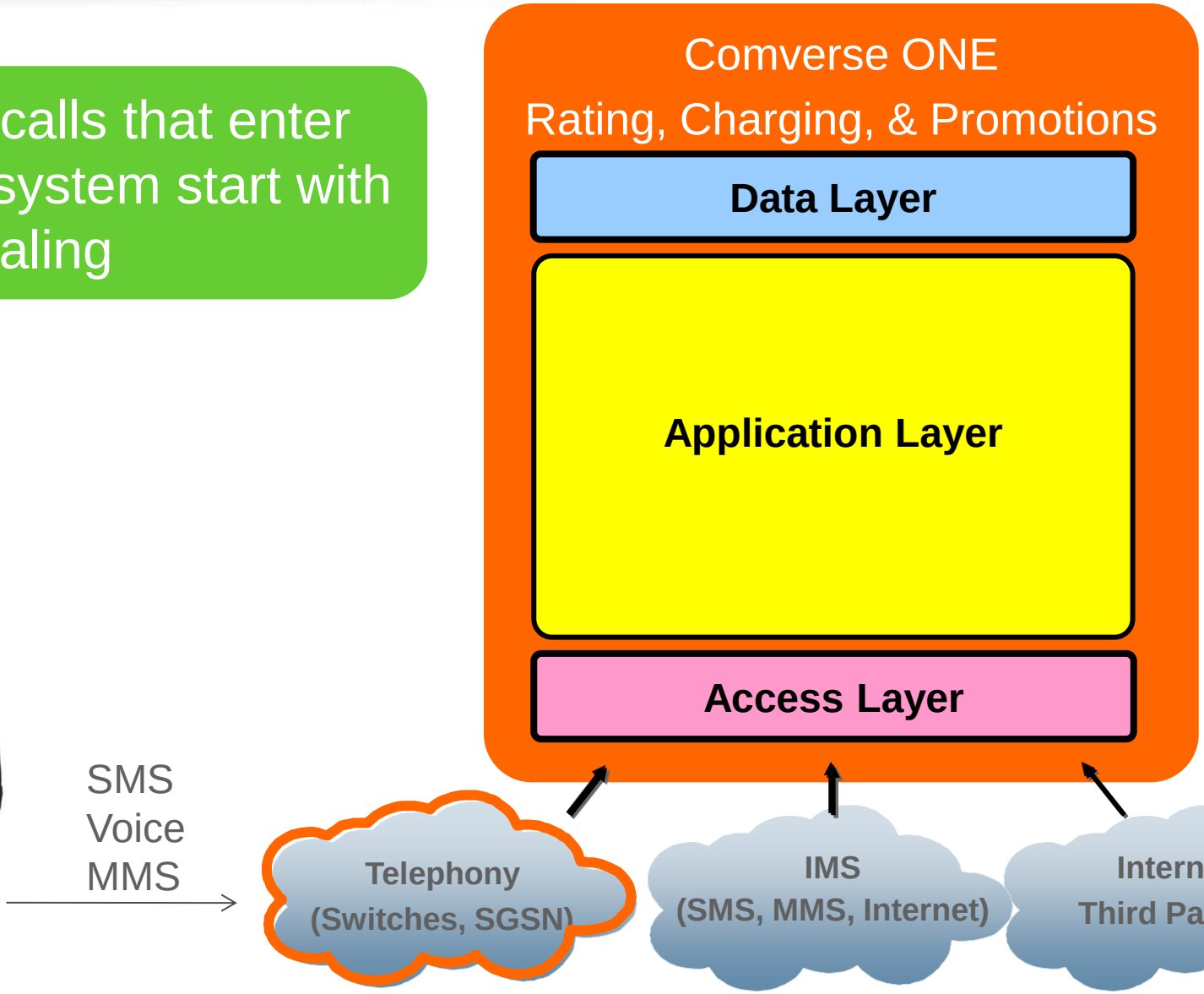
Signaling Protocols

SS7 Message Structure

SS7 and Comverse ONE

Most calls that enter the system start with signaling

SMS
Voice
MMS

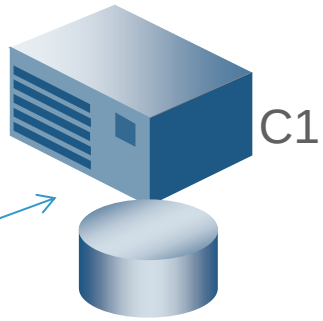


Importance of Understanding SS#7

Deployment

How to connect and configure

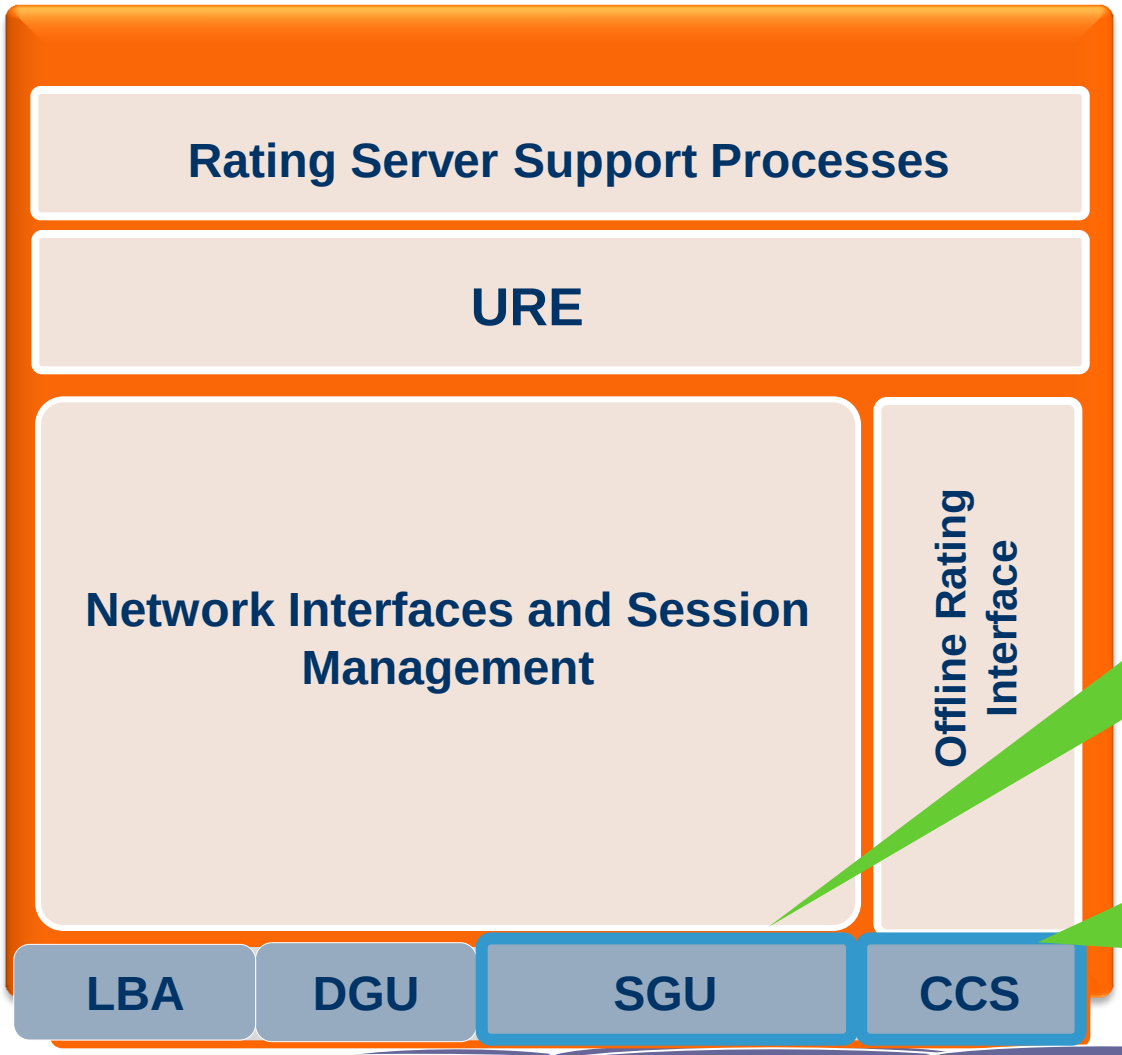
SS#7



Support

Understand the communication

Comverse ONE Components that Handle SS7



Signaling Gateway Unit (SGU)

Accepts and balances signaling traffic

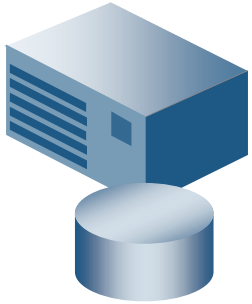
Call Control Server (CCS) –

Gateway for IVR functions

Agenda

- Signaling and Comverse ONE
- **Signaling Role**
- Signaling System Architecture
- Signaling Protocols
- SS7 Message Structure

Signaling and Comverse ONE



Required information:

- Call start/end
- Call originator
- Call destination

This information is in the call **Signaling**

Generic Call Setup

Off-Hook

Dial Destination Number

Ring

Ring Back Tone

Answering

Signaling

Voice

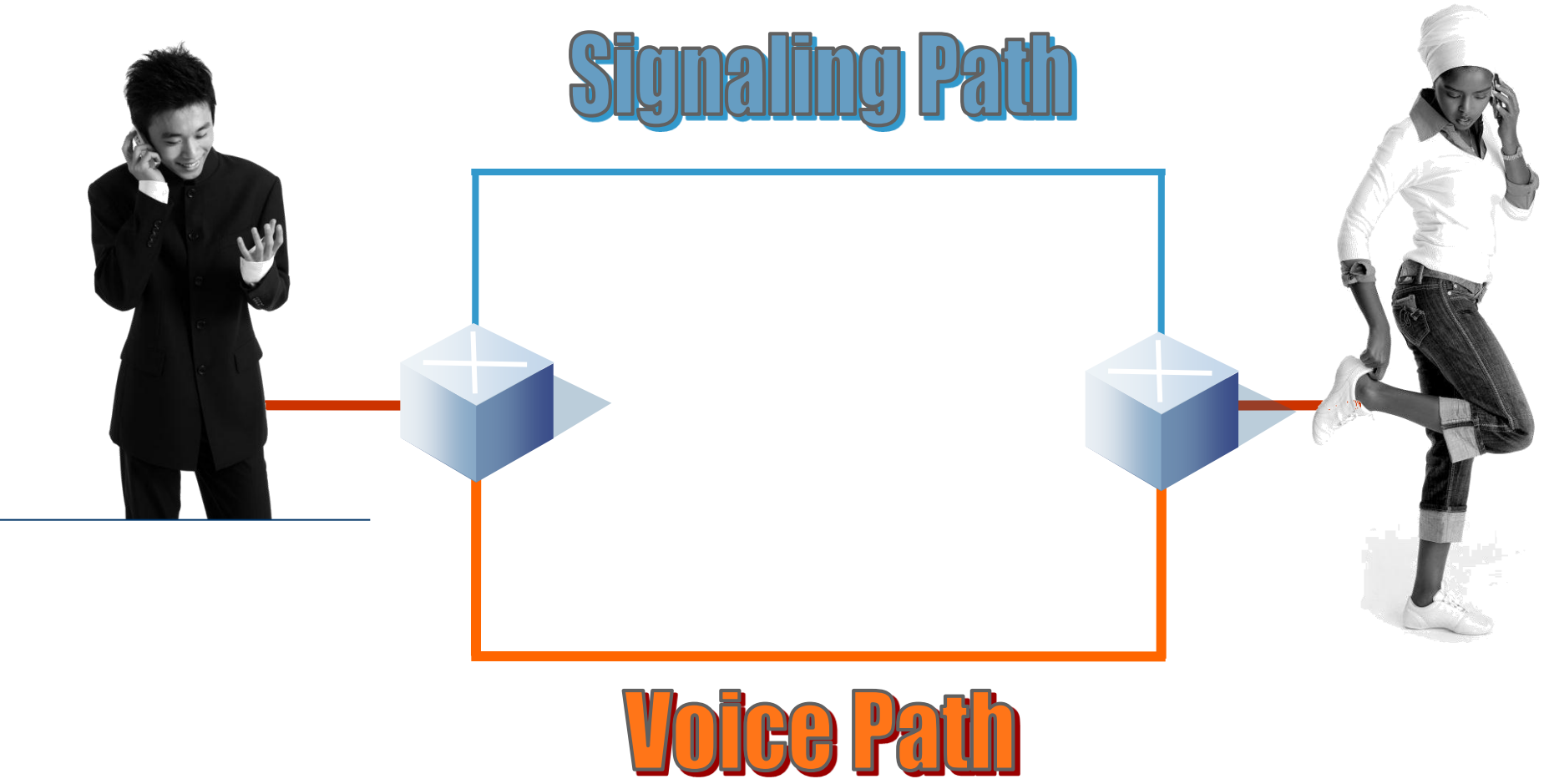
Voice session

On-Hook

Call Completed

Signaling

Call Paths



Review Question – 1

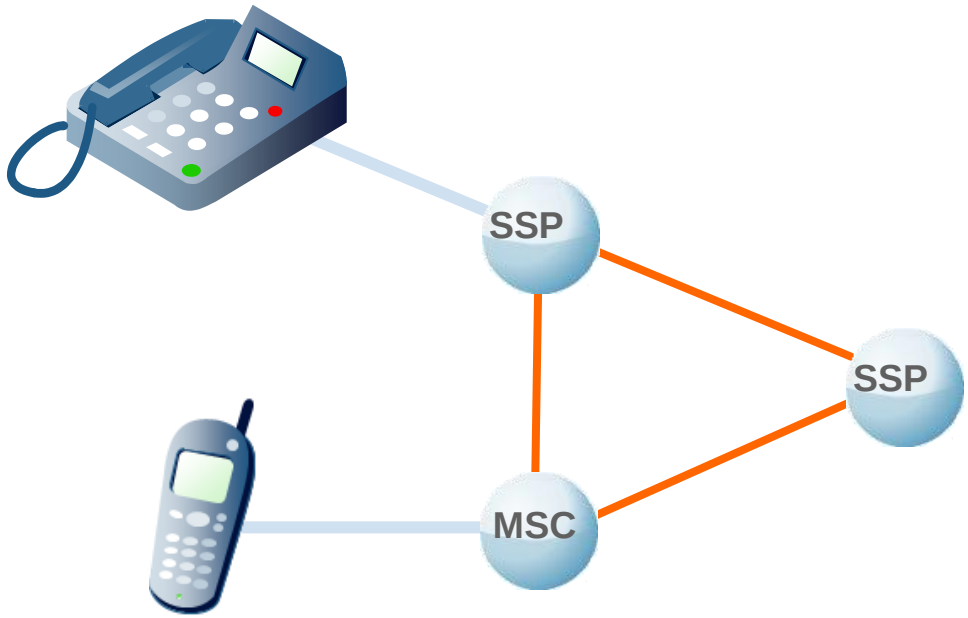
What information is not provided by the signaling path

1. When the call started
2. The content of the call (voice)
3. Who is the caller
4. Who is the called party

Agenda

- Signaling and Comverse ONE
- Signaling Role
- **Signaling System Architecture**
- Signaling Protocols
- SS7 Message Structure

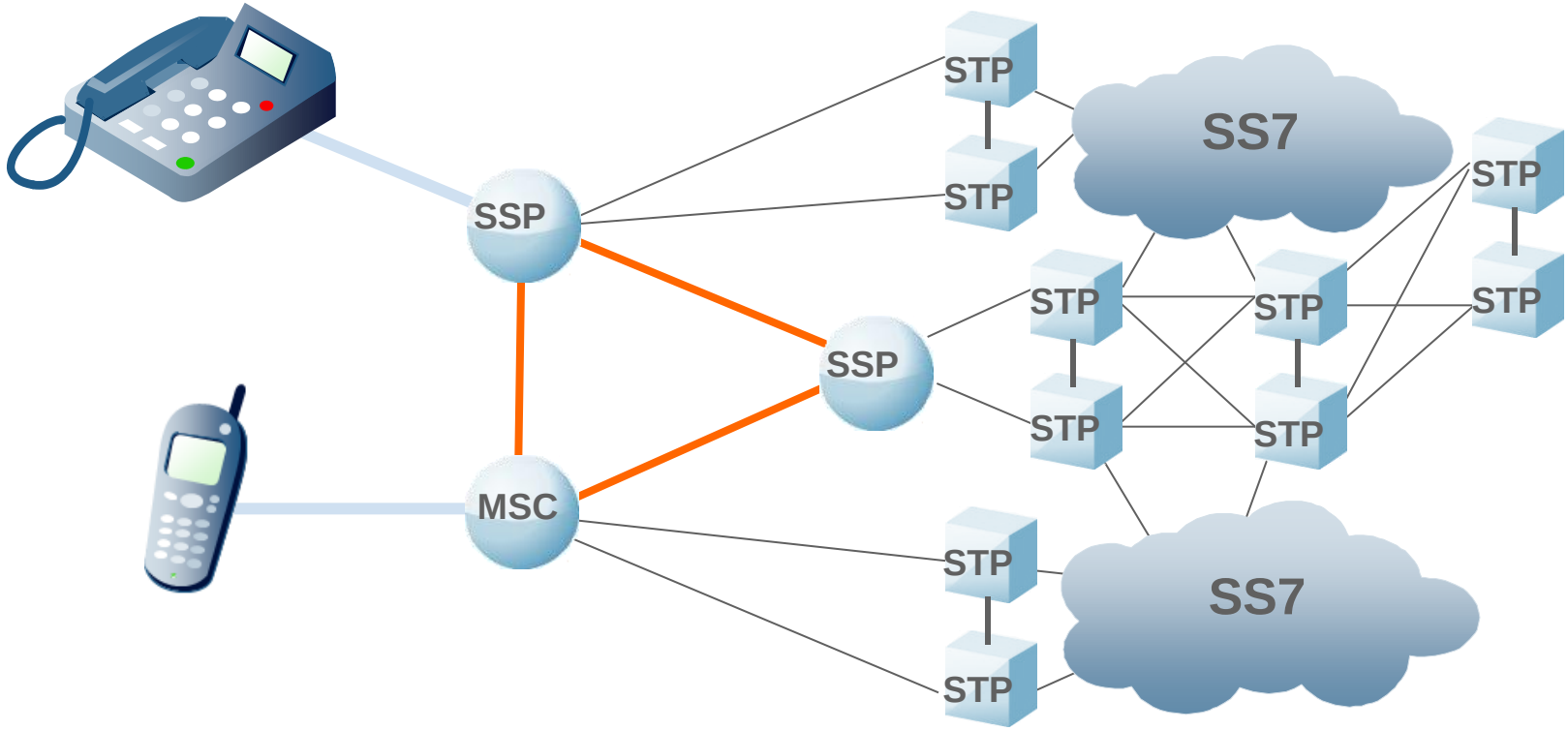
Service Switching Point (SSP)



SSP/ MSC

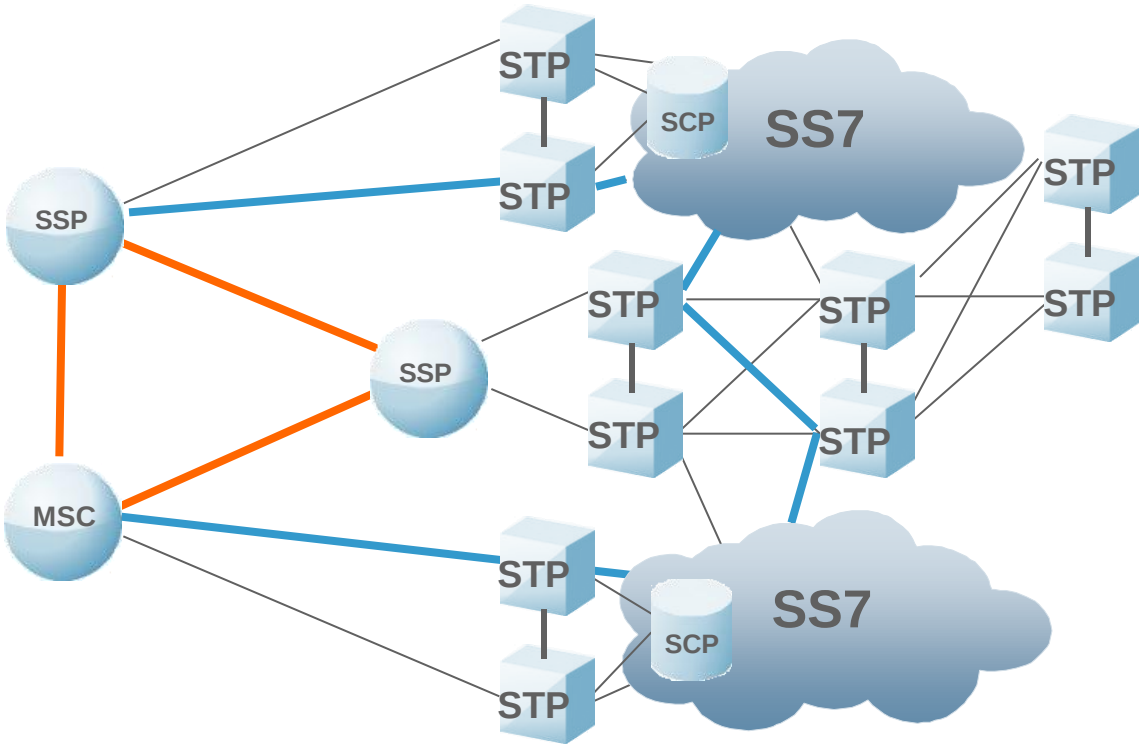
- Originate, terminate or transit calls
- Point-to-Point switch

Switching Transfer Point (STP)

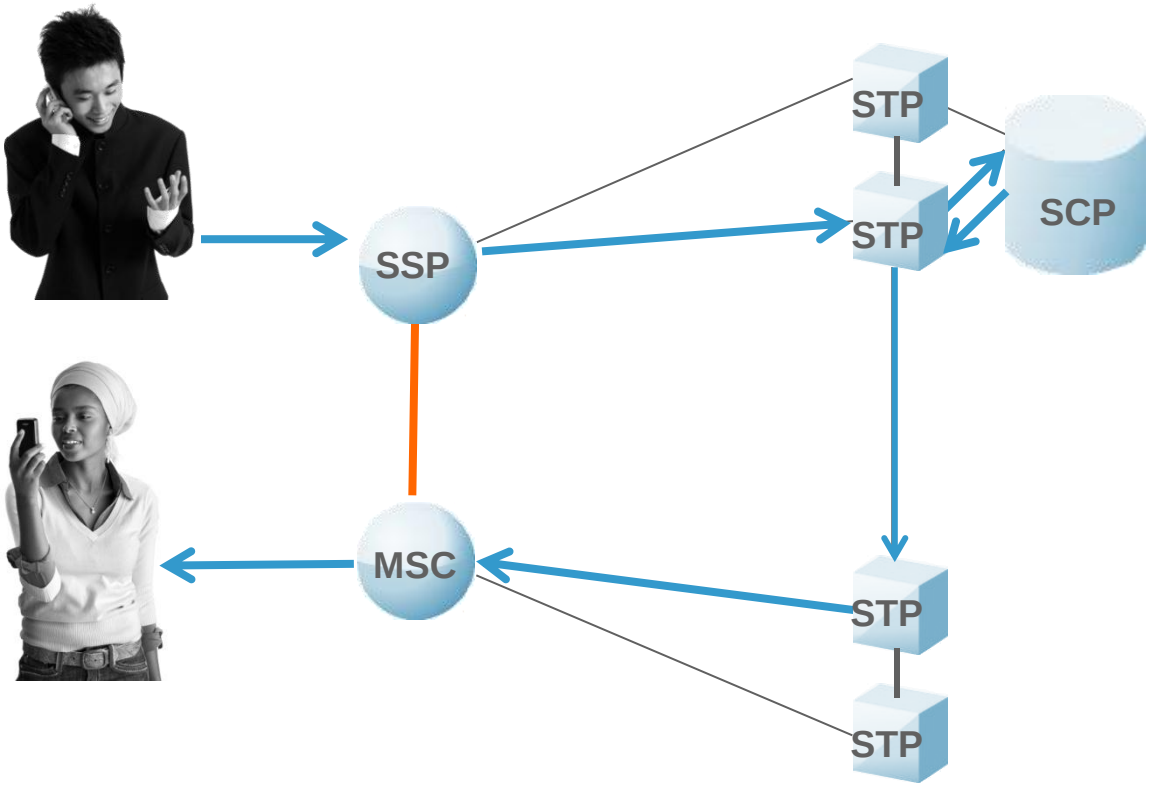


- Acts as a hub/messages router
- Improves utilization and reliability of network
- Eliminates need for direct links

Signaling Control Point (SCP)

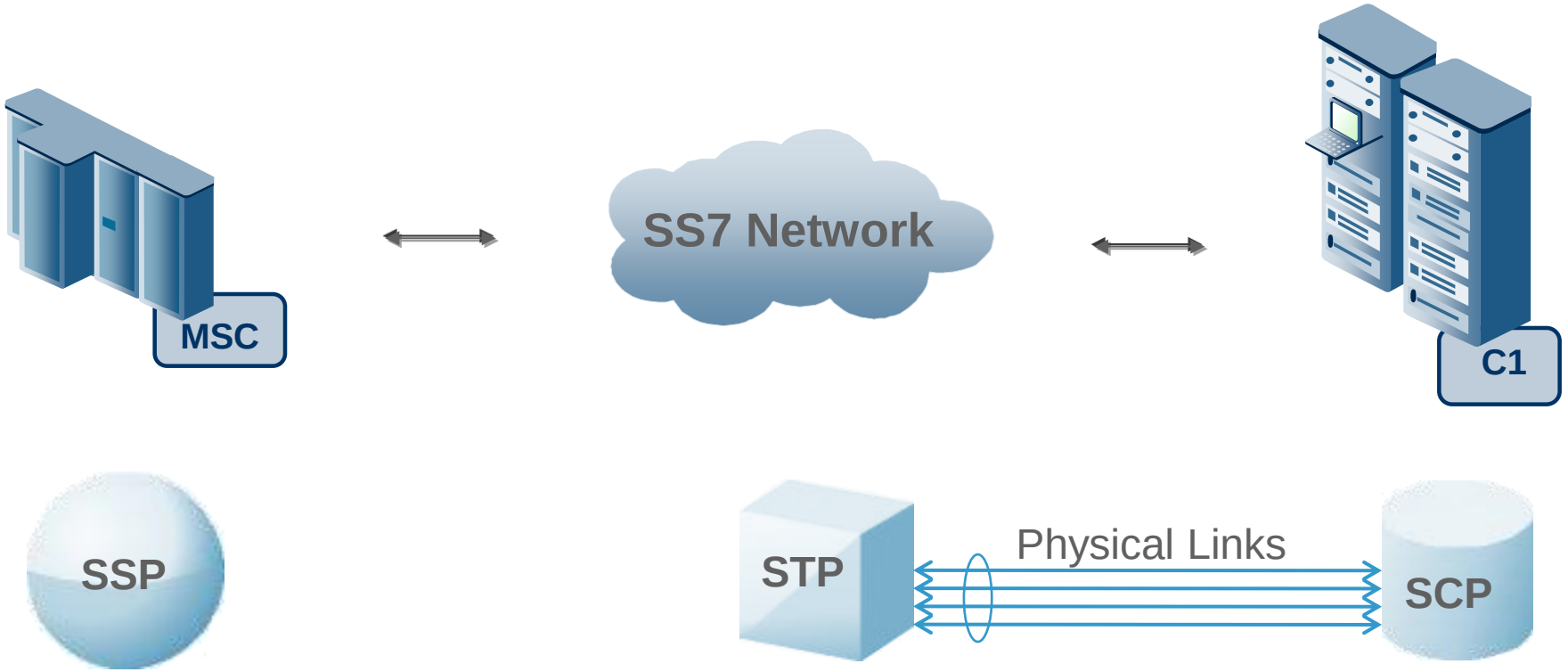


SCP



Provides translation, verification and information

SS7 Entities and Comverse ONE



Review Question – 2

For each definition, select the term it defines from the list below.

A. The Entrance point to SS7 from the PSTN network responsible for switching
B. The part responsible for routing in the SS7
C. A Centralized routing database. SCP
D. The entrance point to the mobile network, responsible for switching

1. SSP
2. MSC
3. SCP
4. STP

Review Question – 3

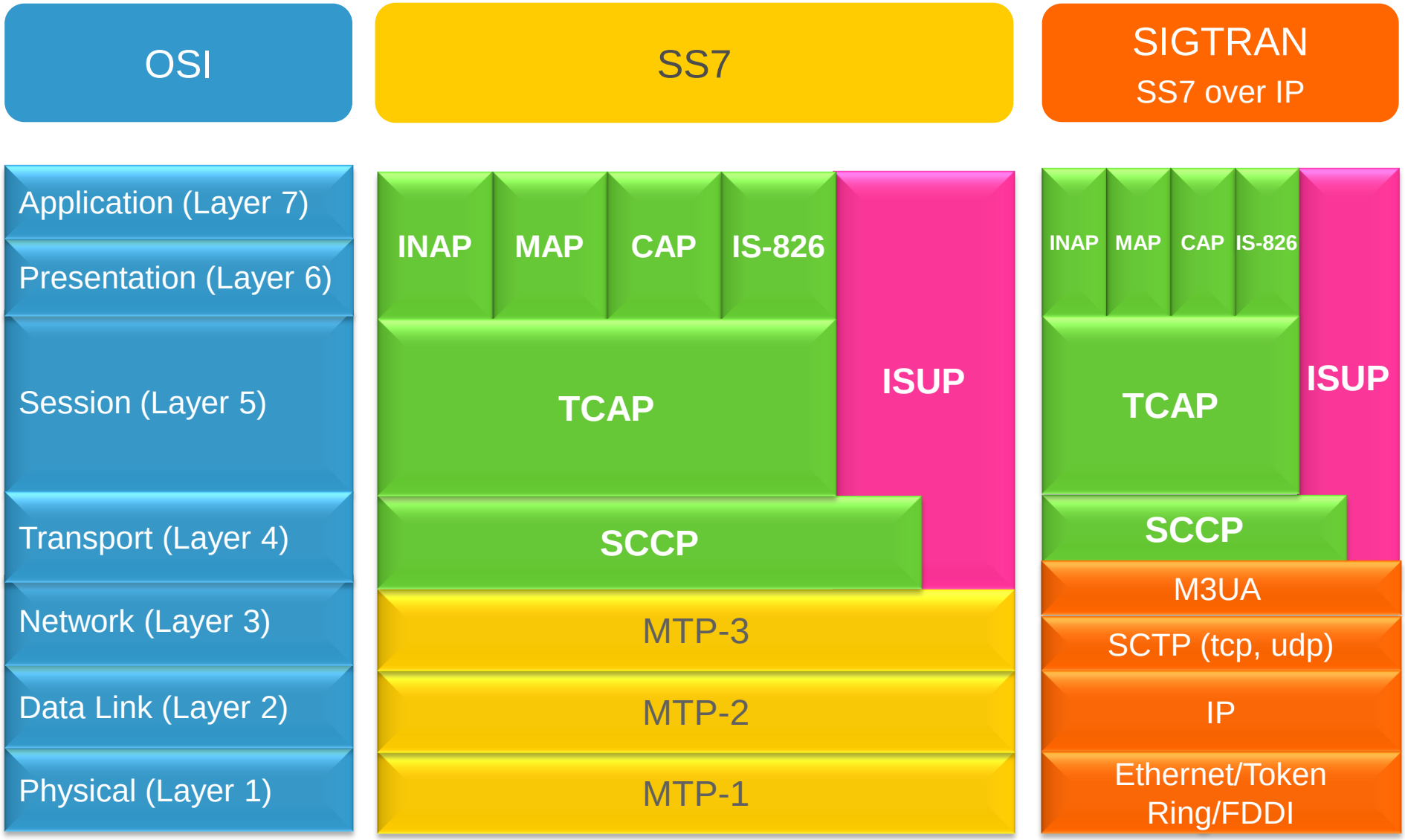
In the SS7 network, Comverse ONE acts as:

1. SSP
2. STP
3. SCP Comverse One acts as SCP
4. MSC

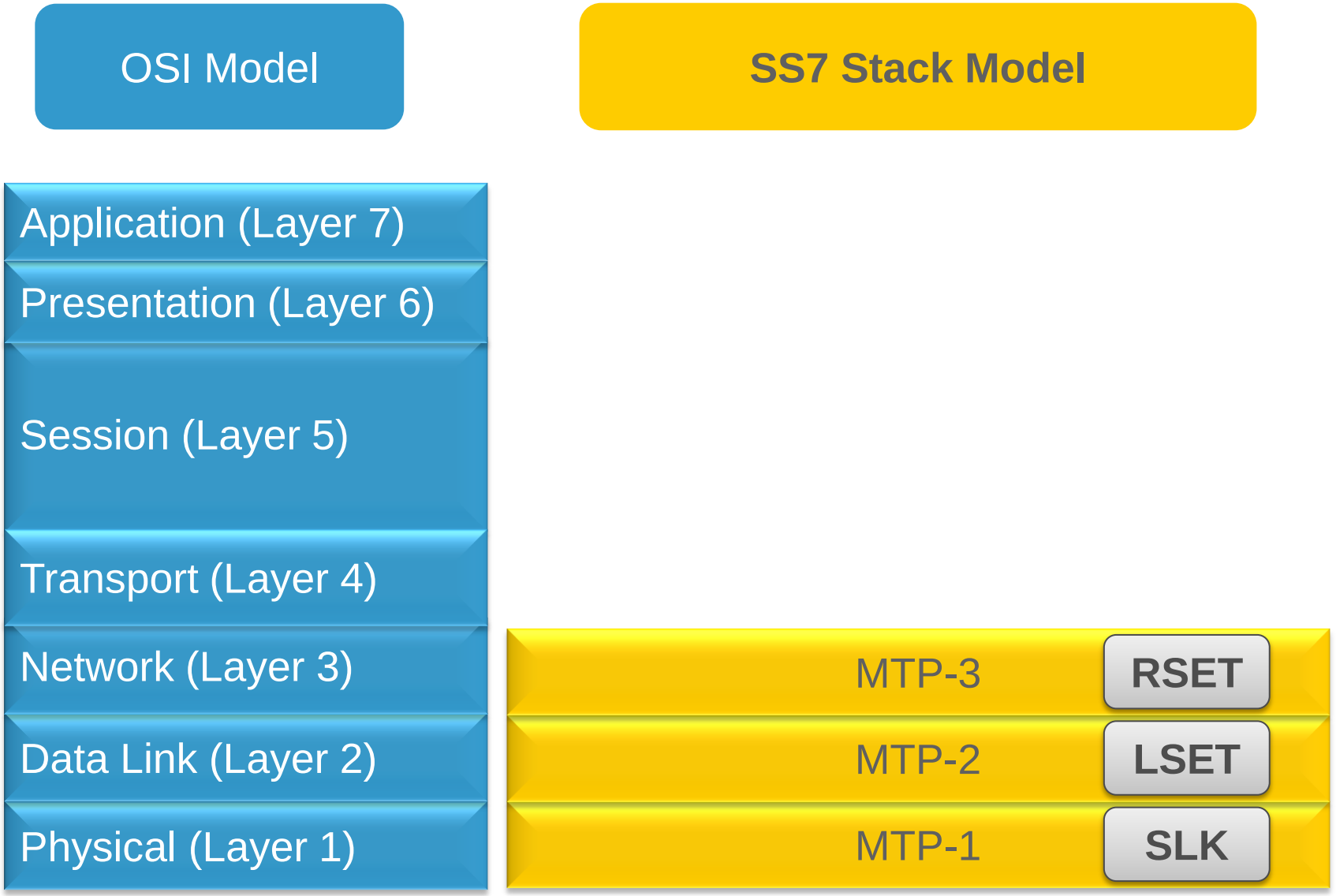
Agenda

- Signaling and Comverse ONE
- Signaling Role
- Signaling System Architecture
- **Signaling Protocols**
- SS7 Message Structure

SS7 Protocols Stack and OSI

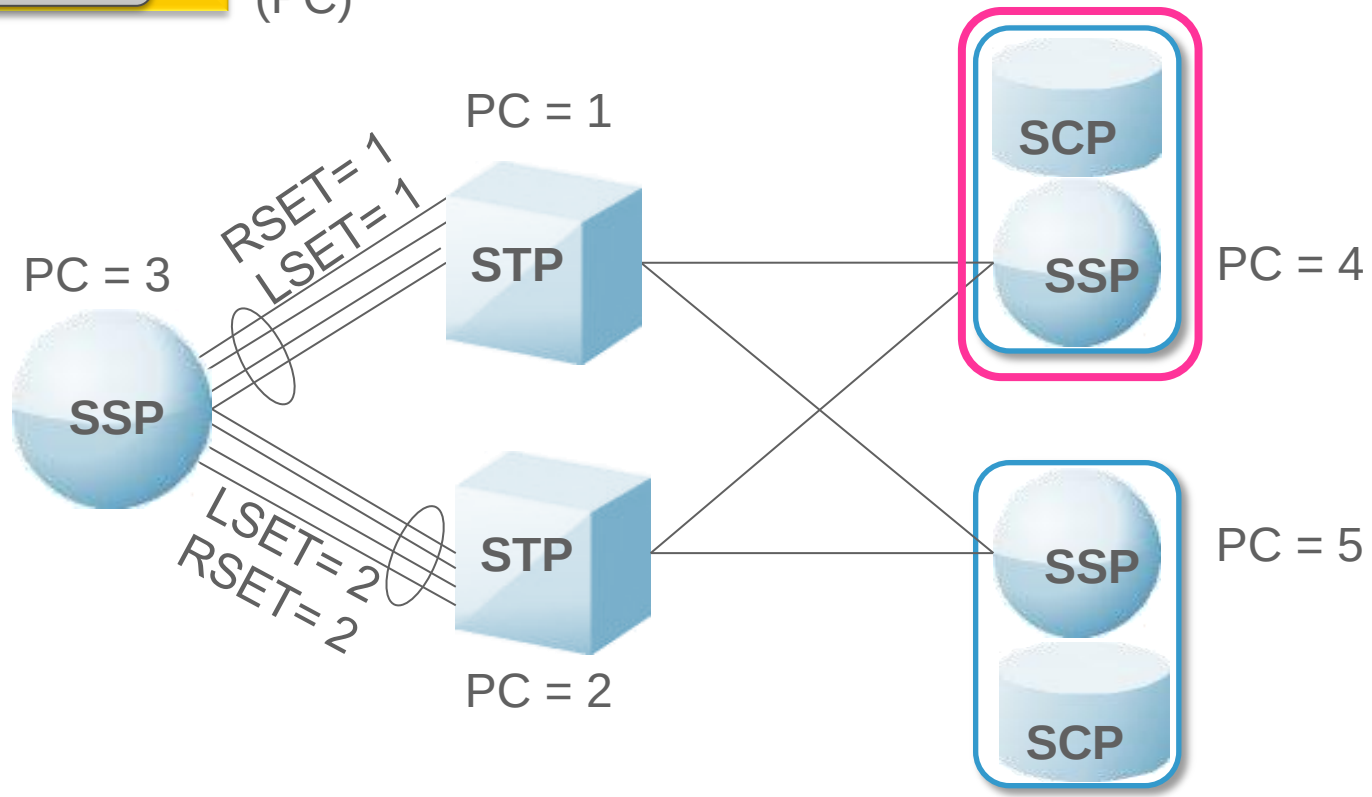


SS7 Protocol Stack Model – Message Transfer Parts (MTP)

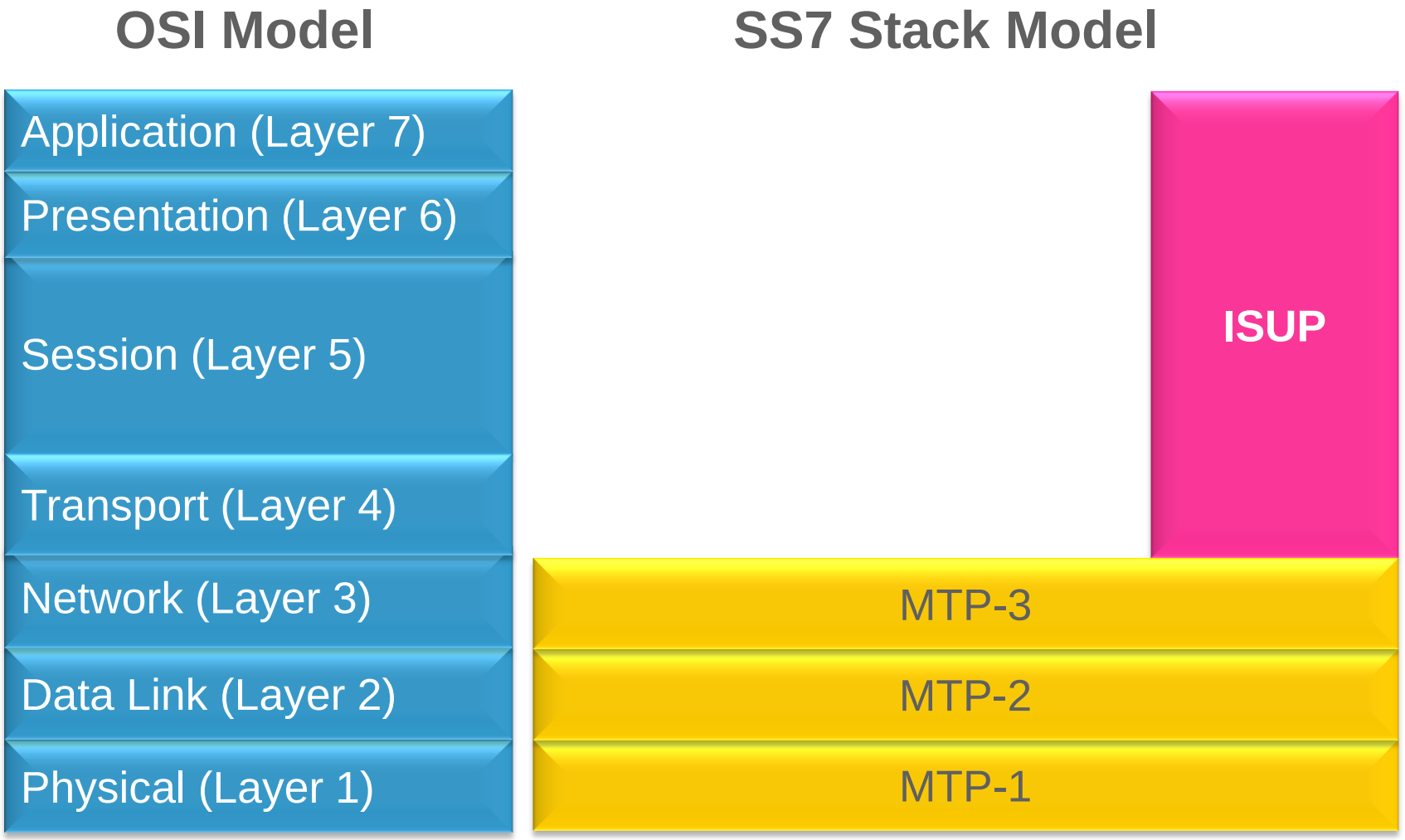


Links, Linksets, Routes, and Routesets

Point Code (PC)		Unique address of a Signaling Point
MTP-3	**RSET**	All linksets between 2 signaling end points (PC)
MTP-2	**LSET**	All signaling links between 2 signaling points (PC)
MTP-1	**SLK**	Direct connection between 2 adjacent signaling points (PC)

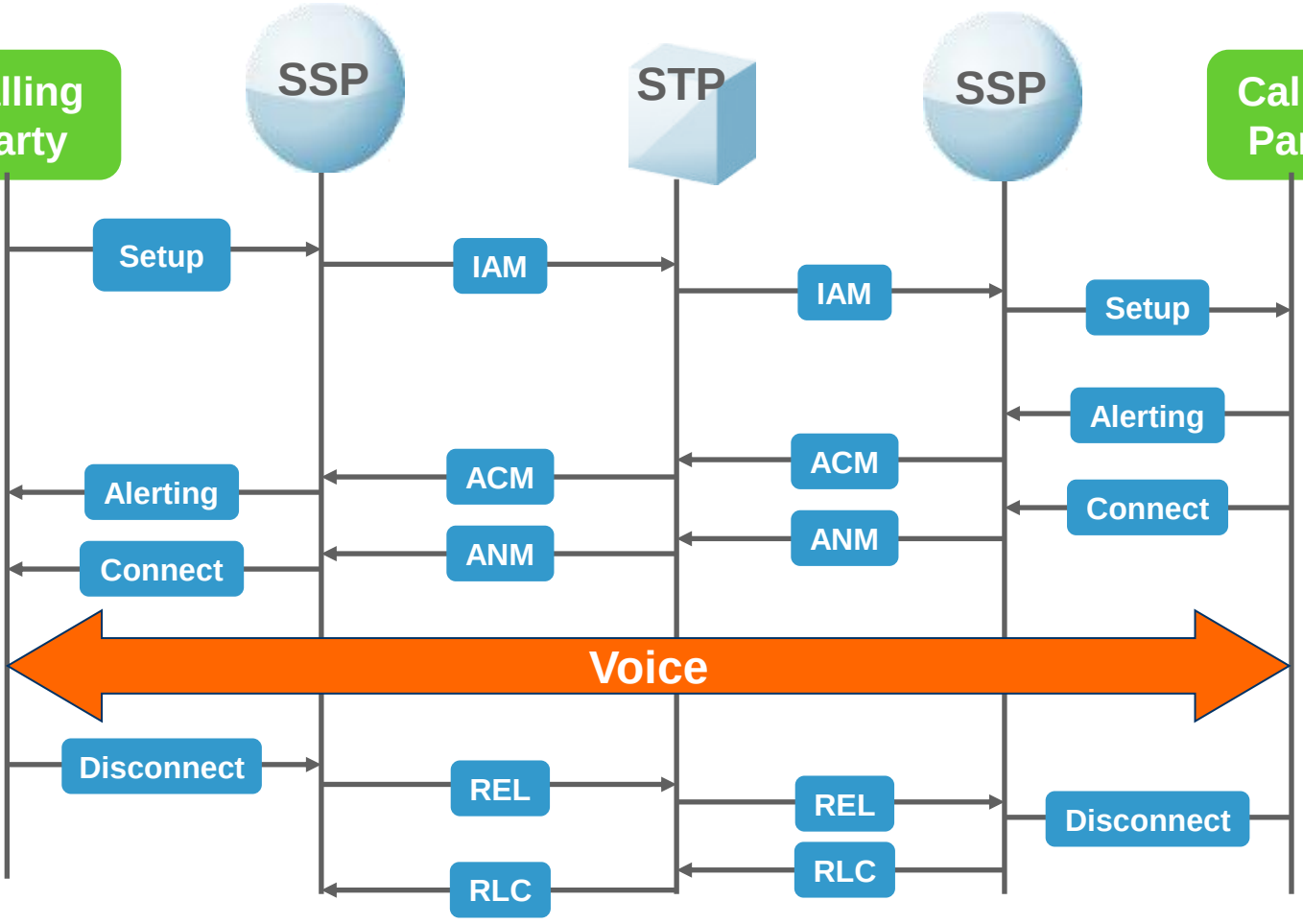


The ISDN User Part (ISUP)

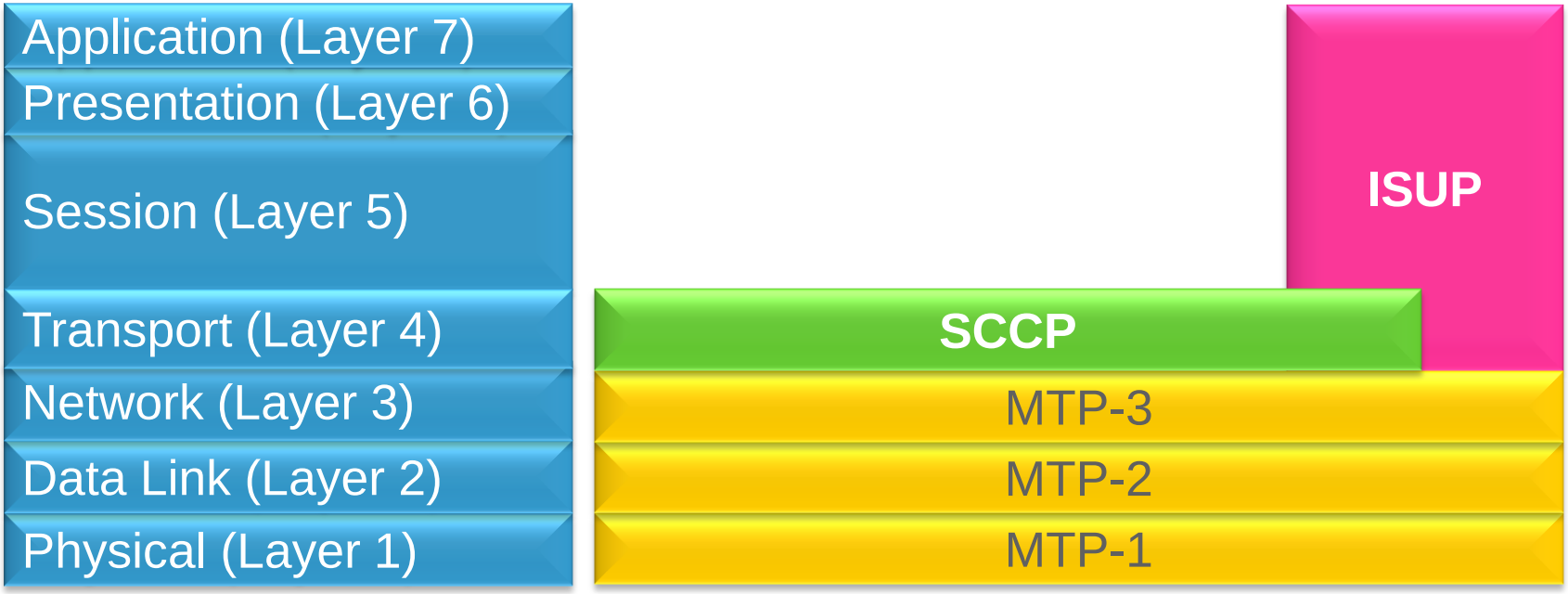


Typical ISUP Call Control

Example: Basic Call Setup/Teardown



Signaling Connection Control Part (SCCP)

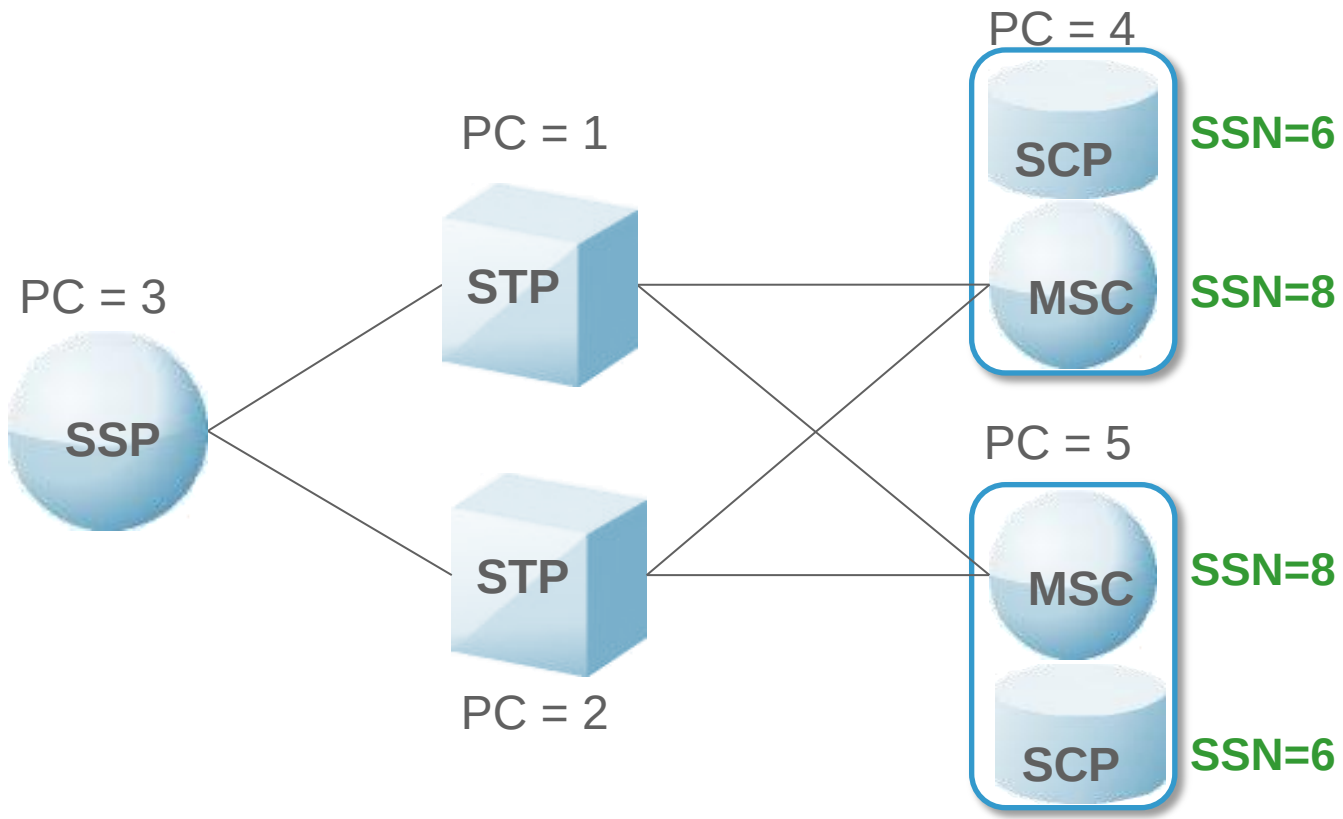


Signaling Connection Control Part (SCCP)

SCCP enables:

- To address an application within a signaling point using SSN
- Routing using GT

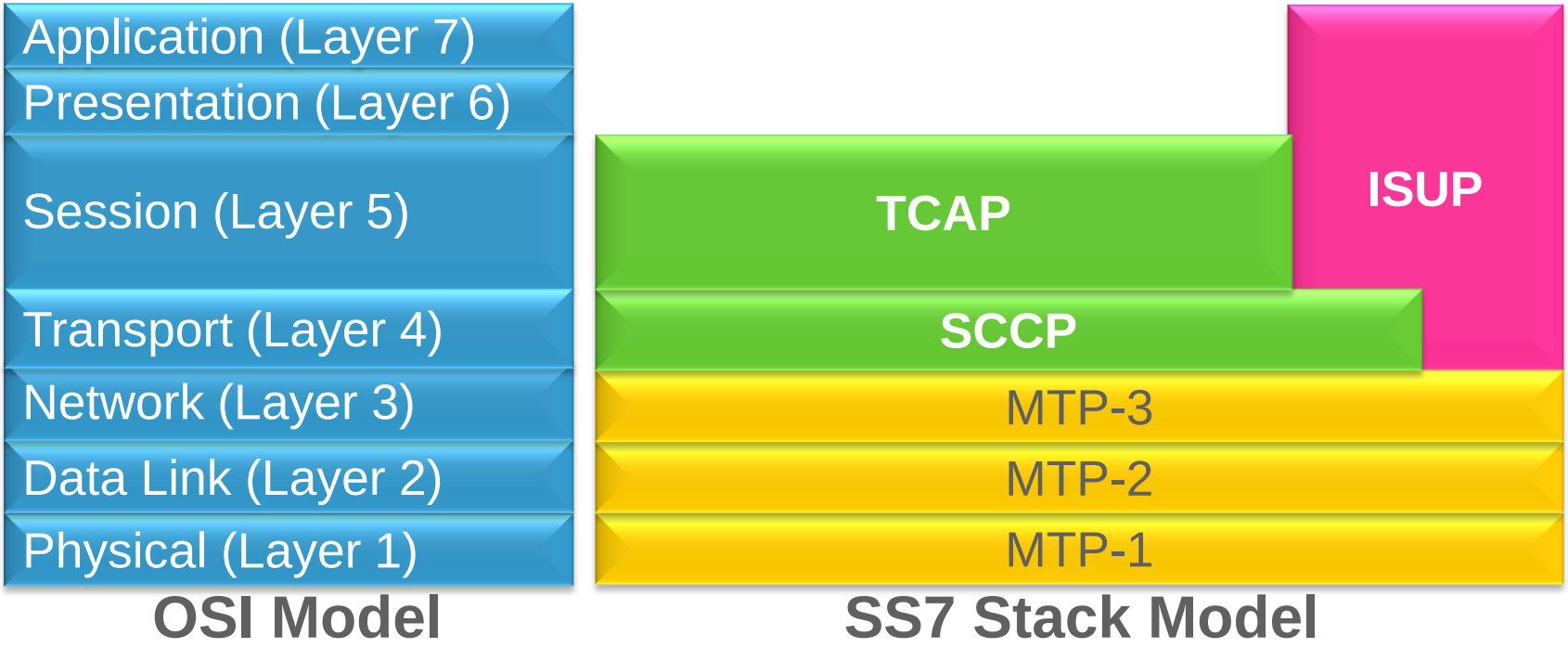
Area code	Operator prefix	Line number
712	354	3234



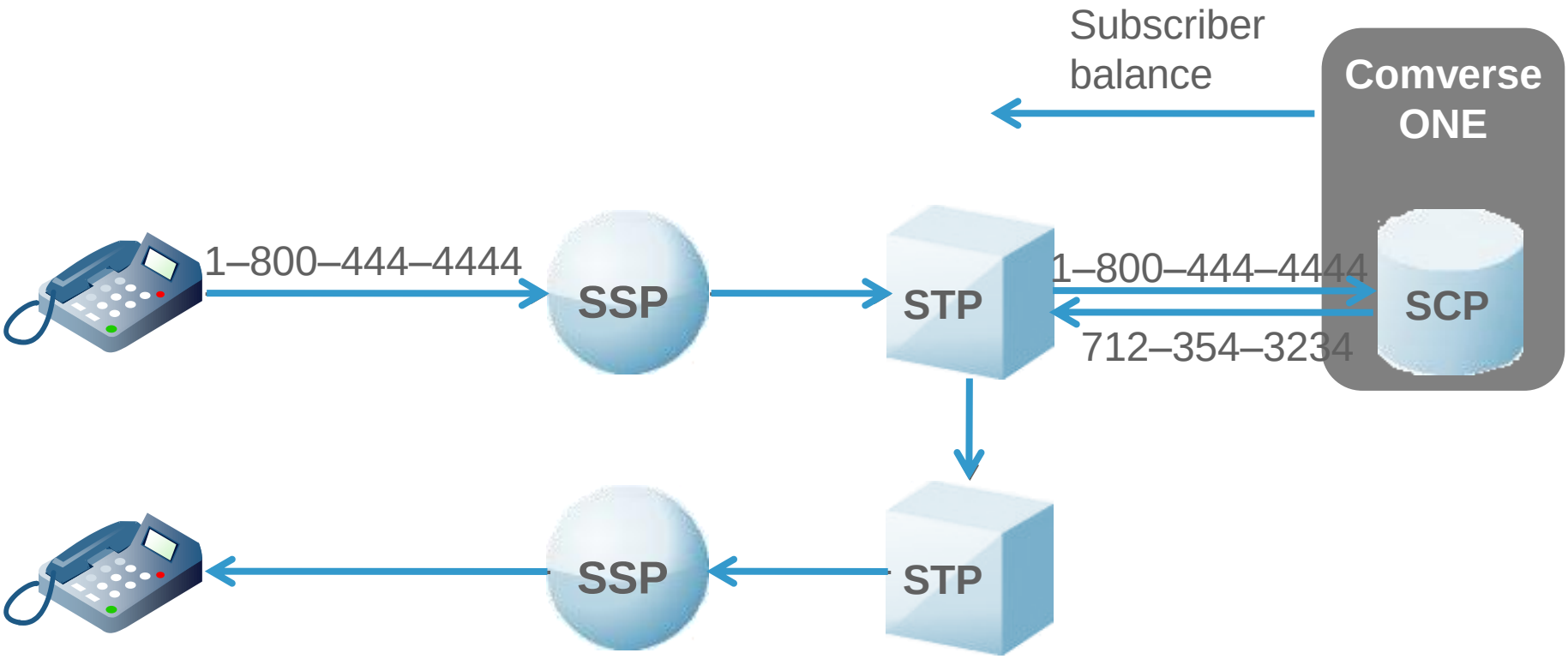
Transaction Capabilities Application Part (TCAP)

TCAP functions:

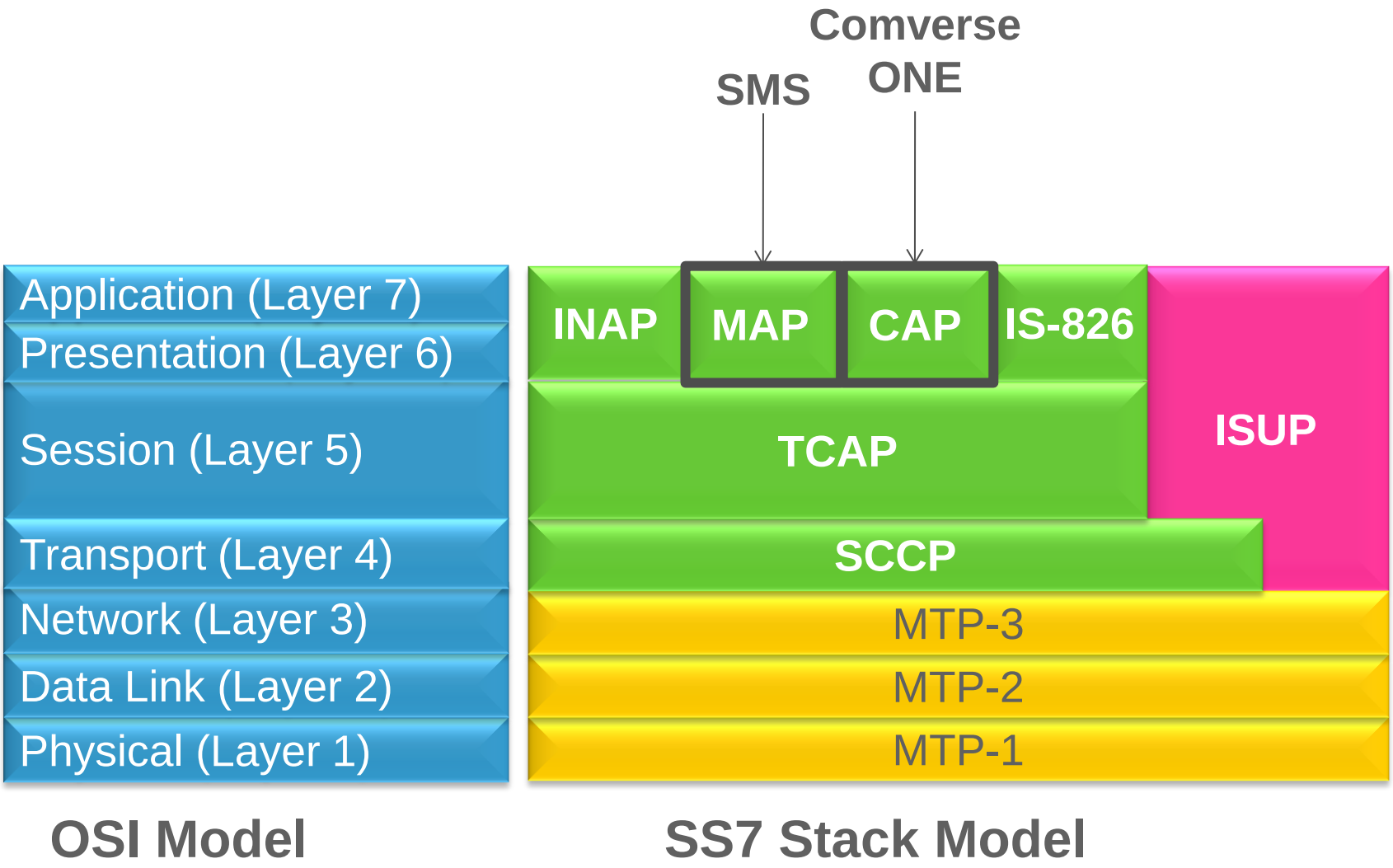
- Data transfer capabilities
- Database services



IN and Database Usage



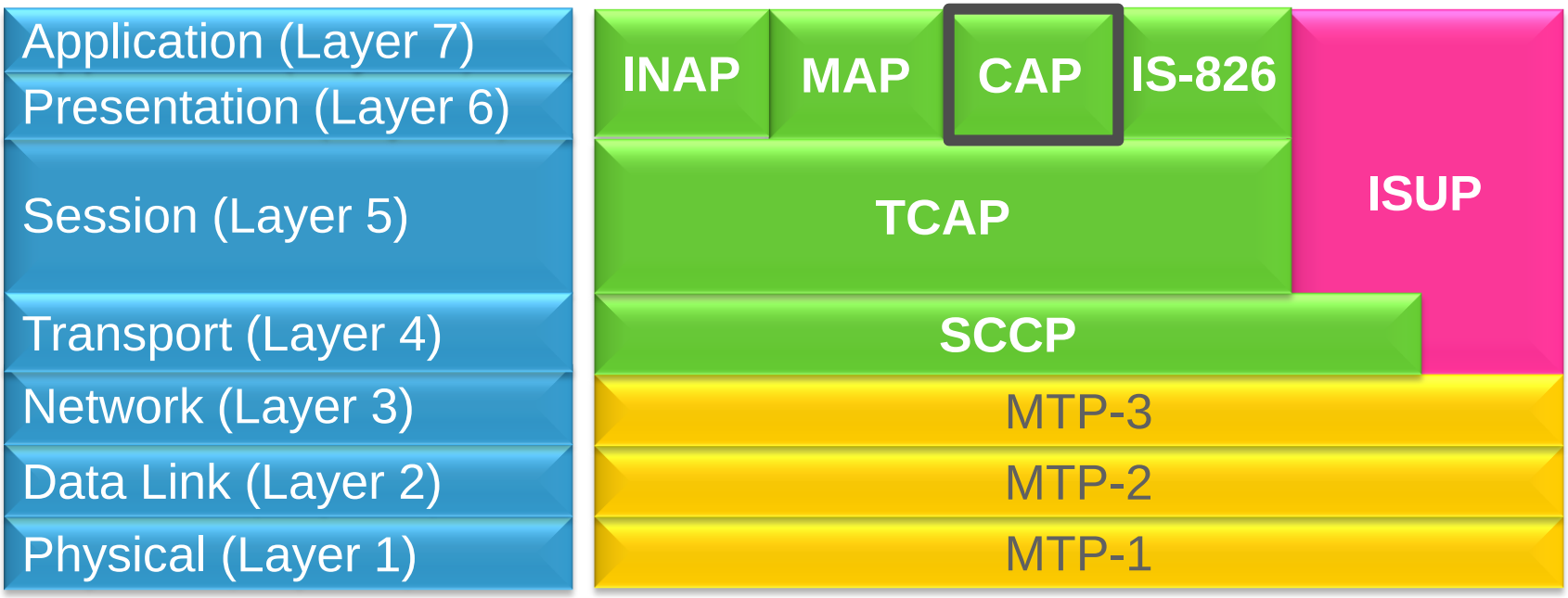
Application Layer



CAMEL Application Part (CAP)

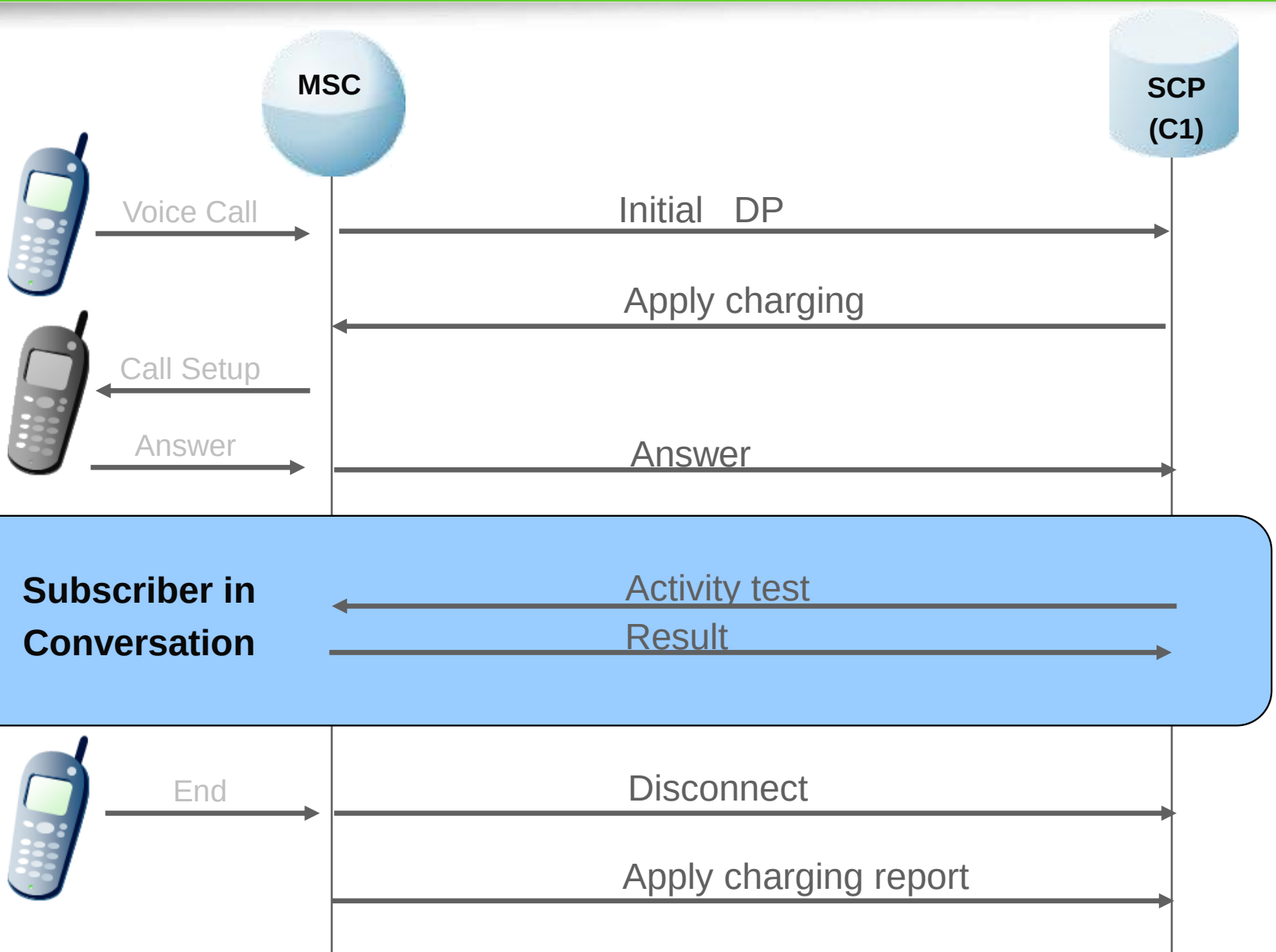
CAMEL Application Part (CAP) :

- Used in mobile networks
- Allows implementation of Value added Service

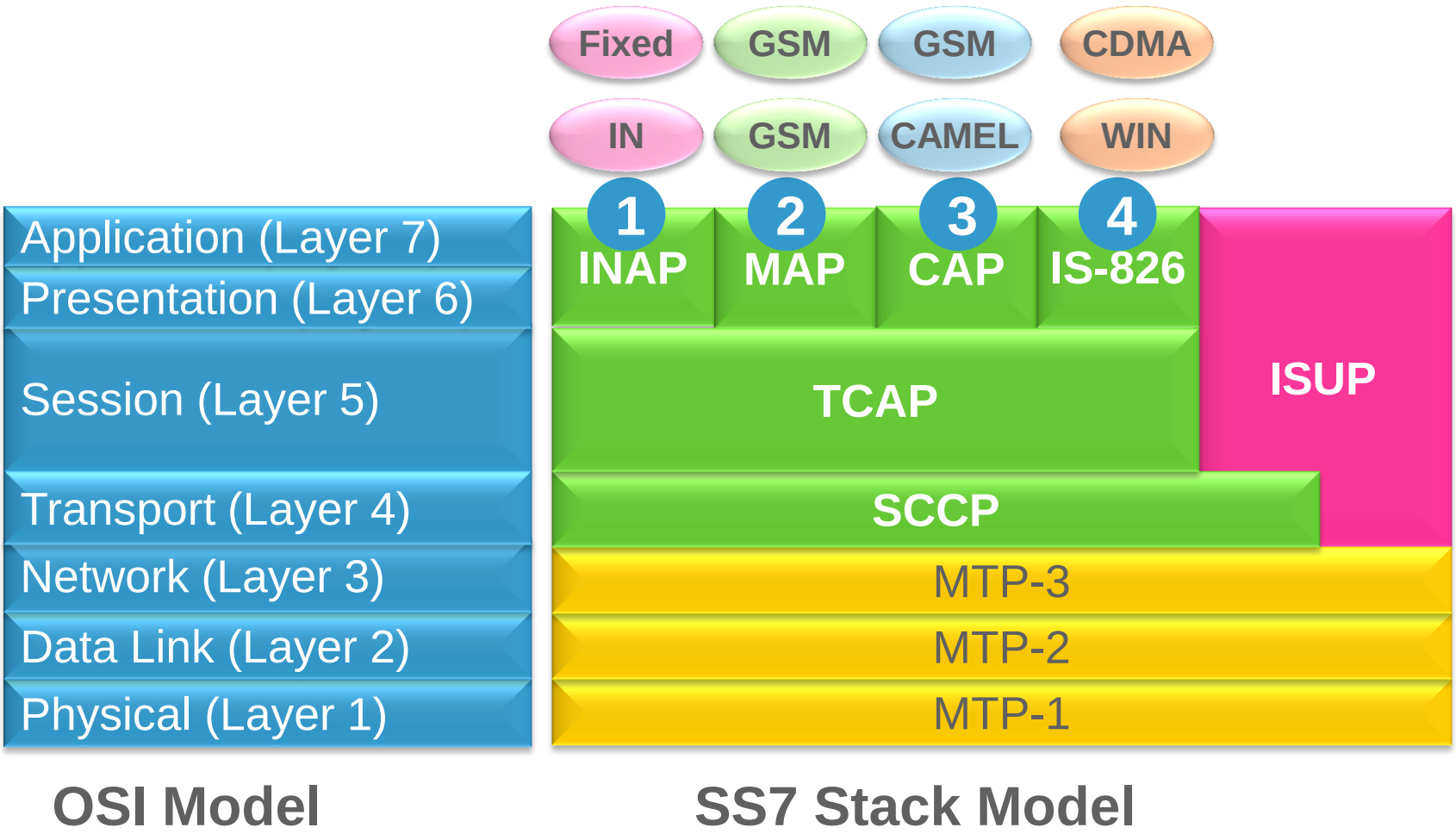


OSI Model **SS7 Stack Model**

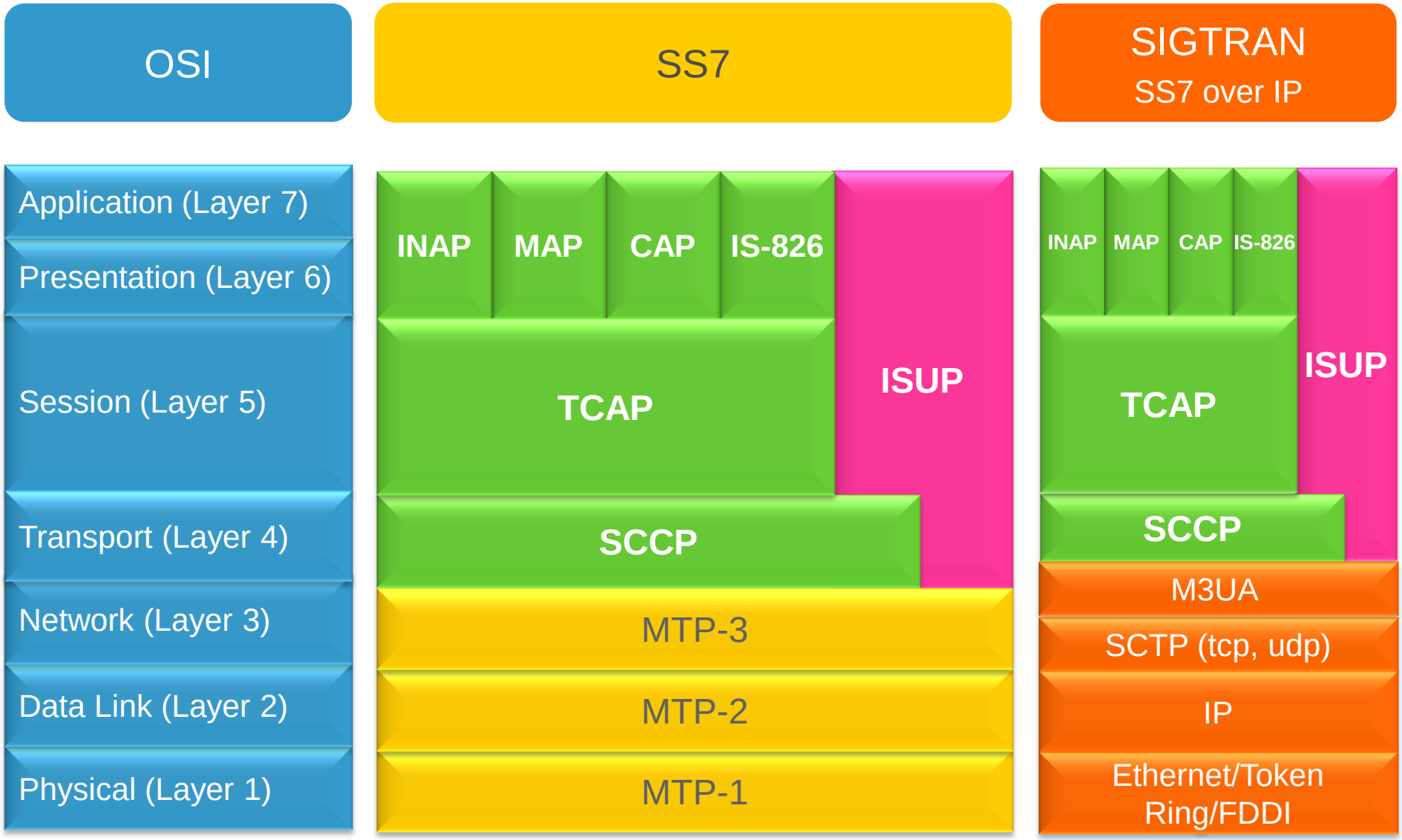
Voice CAP2 Call Flow – Comverse ONE Example



Application Layer



SS7 Protocols Stack and OSI

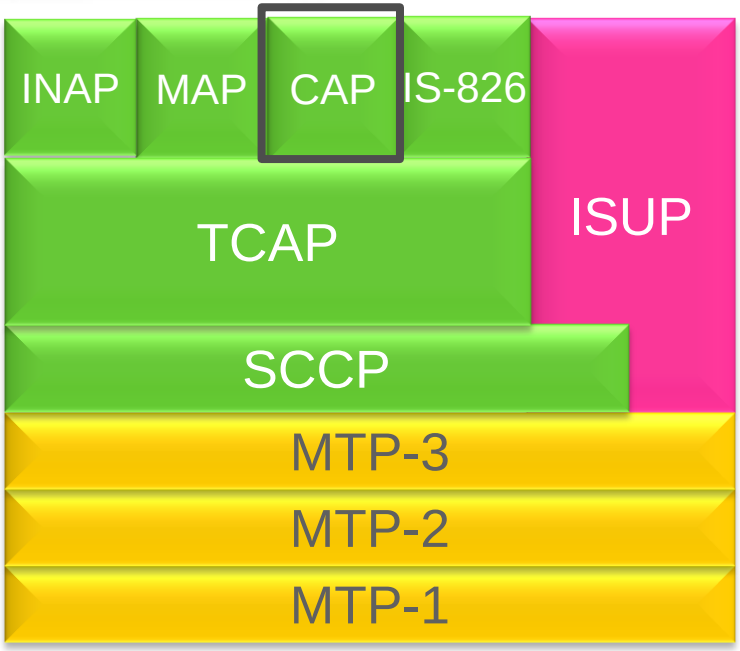


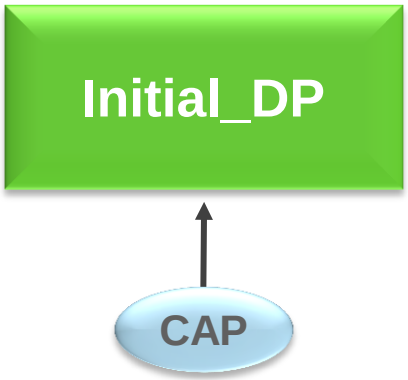
Agenda

- Signaling and Comverse ONE
- Signaling Role
- Signaling System Architecture
- Signaling Protocols
- **SS7 Message Structure**

Application Layer (CAP)

The message bits as created by CAP

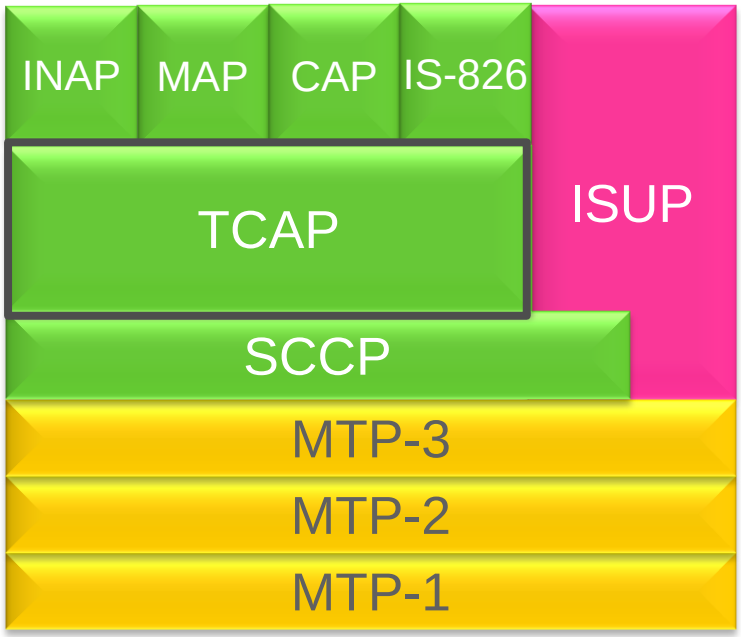


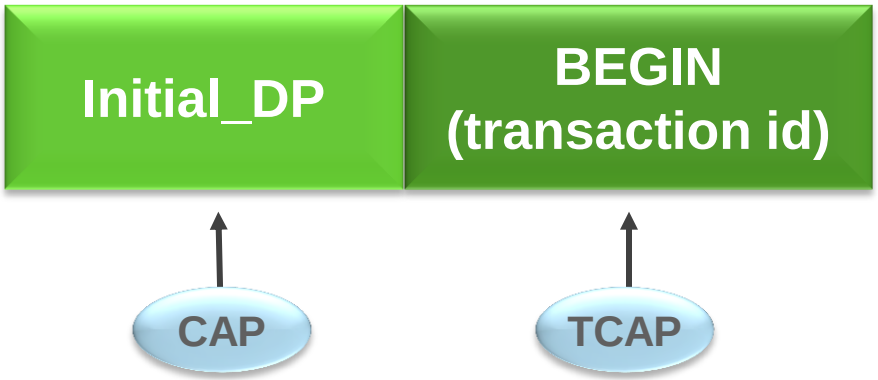


Session Layer (TCAP)

Transaction Capabilities Application Part (TCAP):

- Used to communicate between applications in nodes
- Used for database services
  - Prepaid
  - Repeat dialing
  - Call return

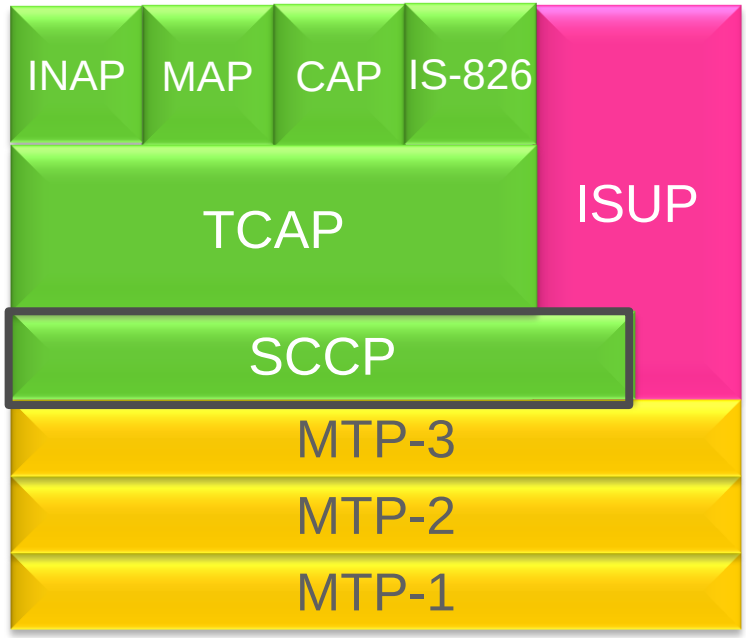


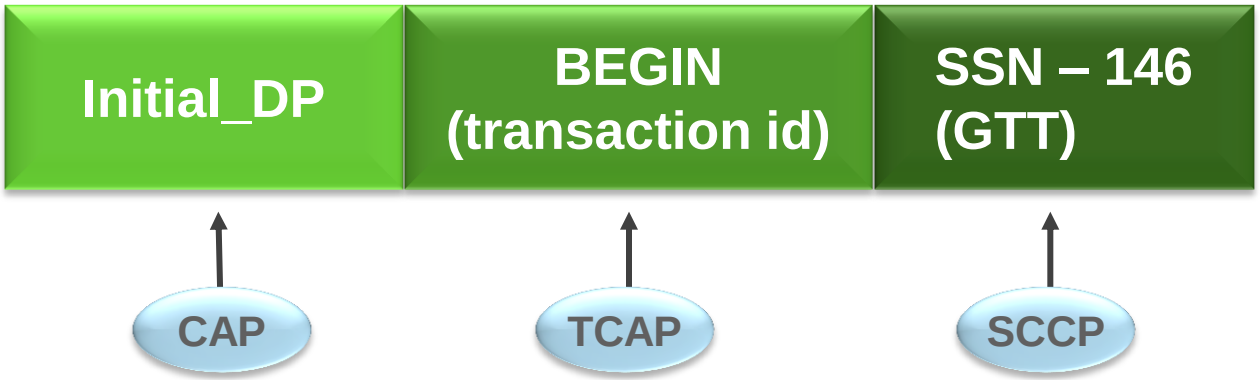


Transport Layer (SCCP)

Signaling Connection Control Part (SCCP):

- GT – Global title
- Subsystem Number (SSN): 1 byte

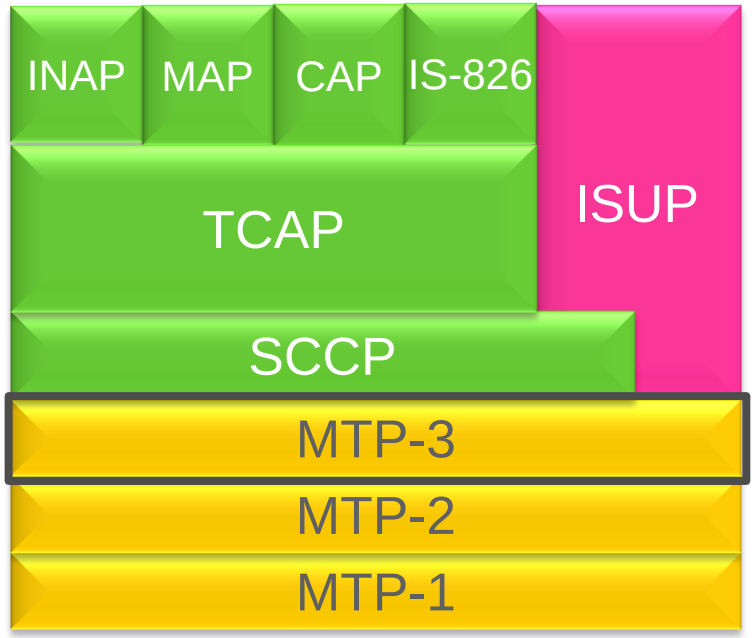


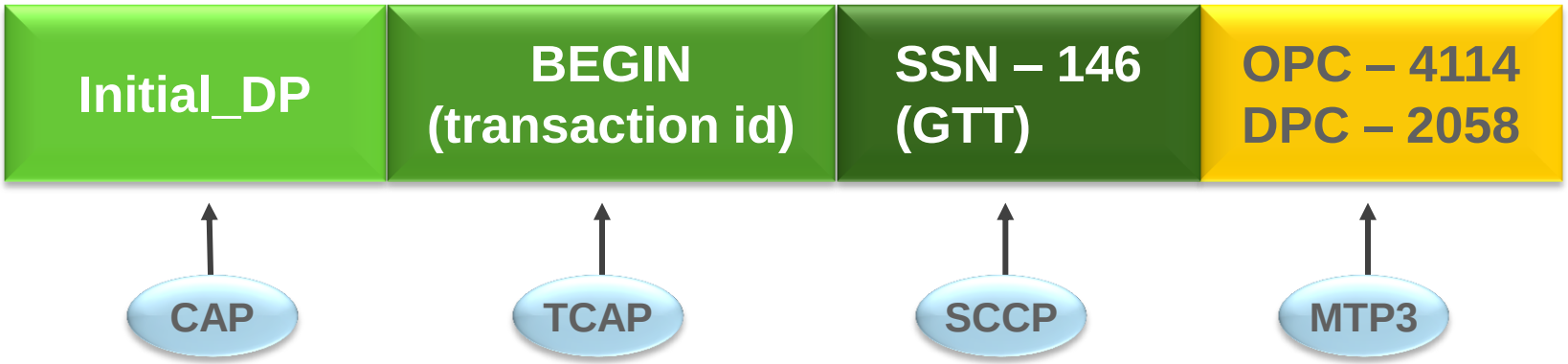


Network Layer (MTP-3)

Message Transfer Part 3 (MTP3):

- Network layer functionality
- Node addressing, routing, alternate routing and congestion control

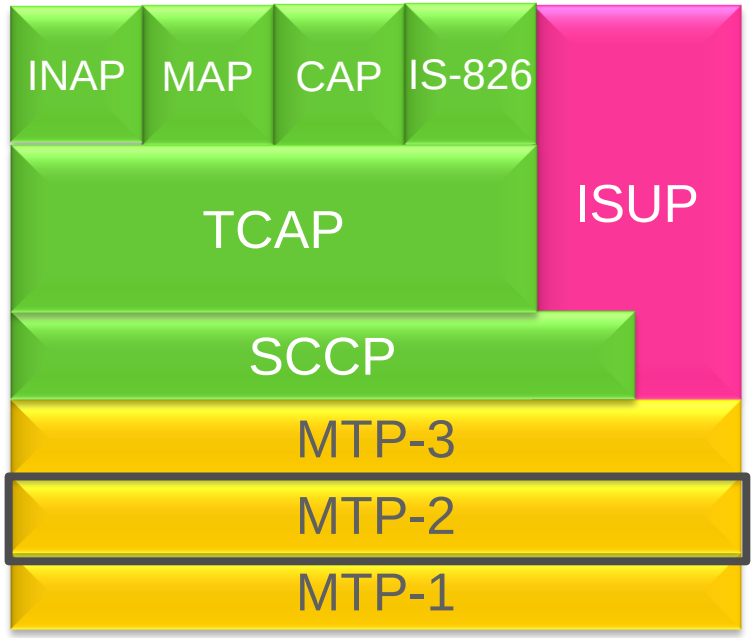


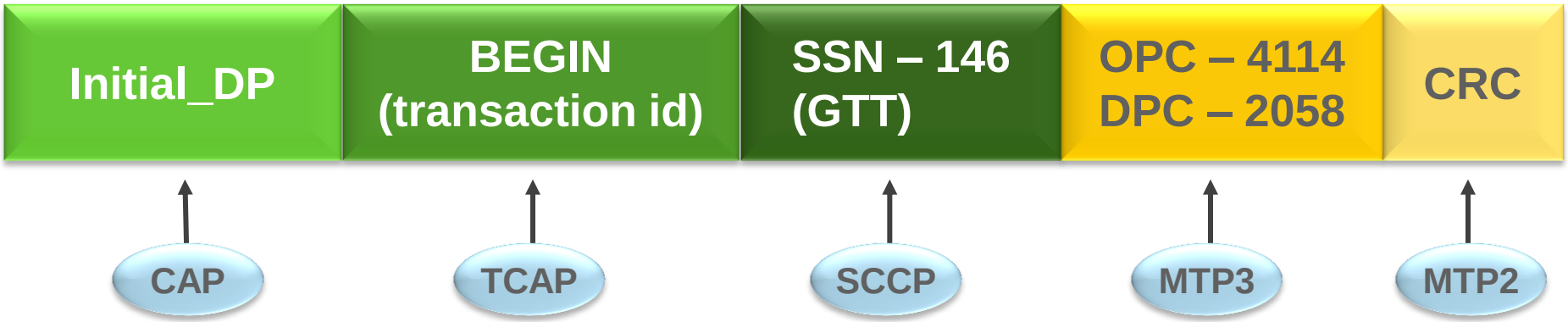


Data Link Layer (MTP-2)

Message Transfer Part 2 (MTP2)

- Ensure reliable exchange of signaling messages
- Error checking
- Sequence checking

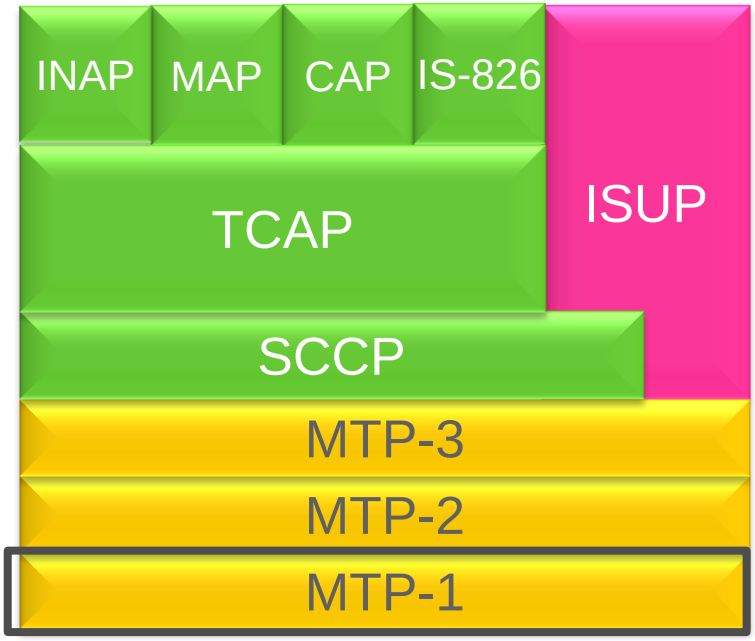




Physical Layer (MTP-1)

Message Transfer Part 1 (MTP1):

- Defines the physical and electrical characteristics of the signaling links

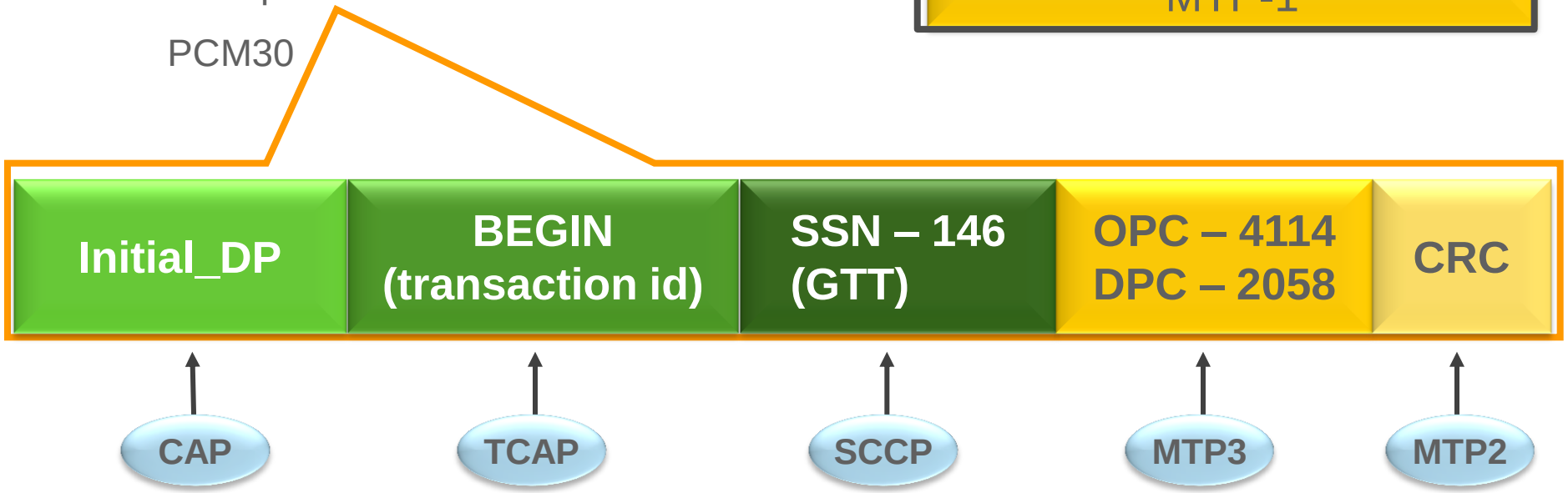


E1 num 6.

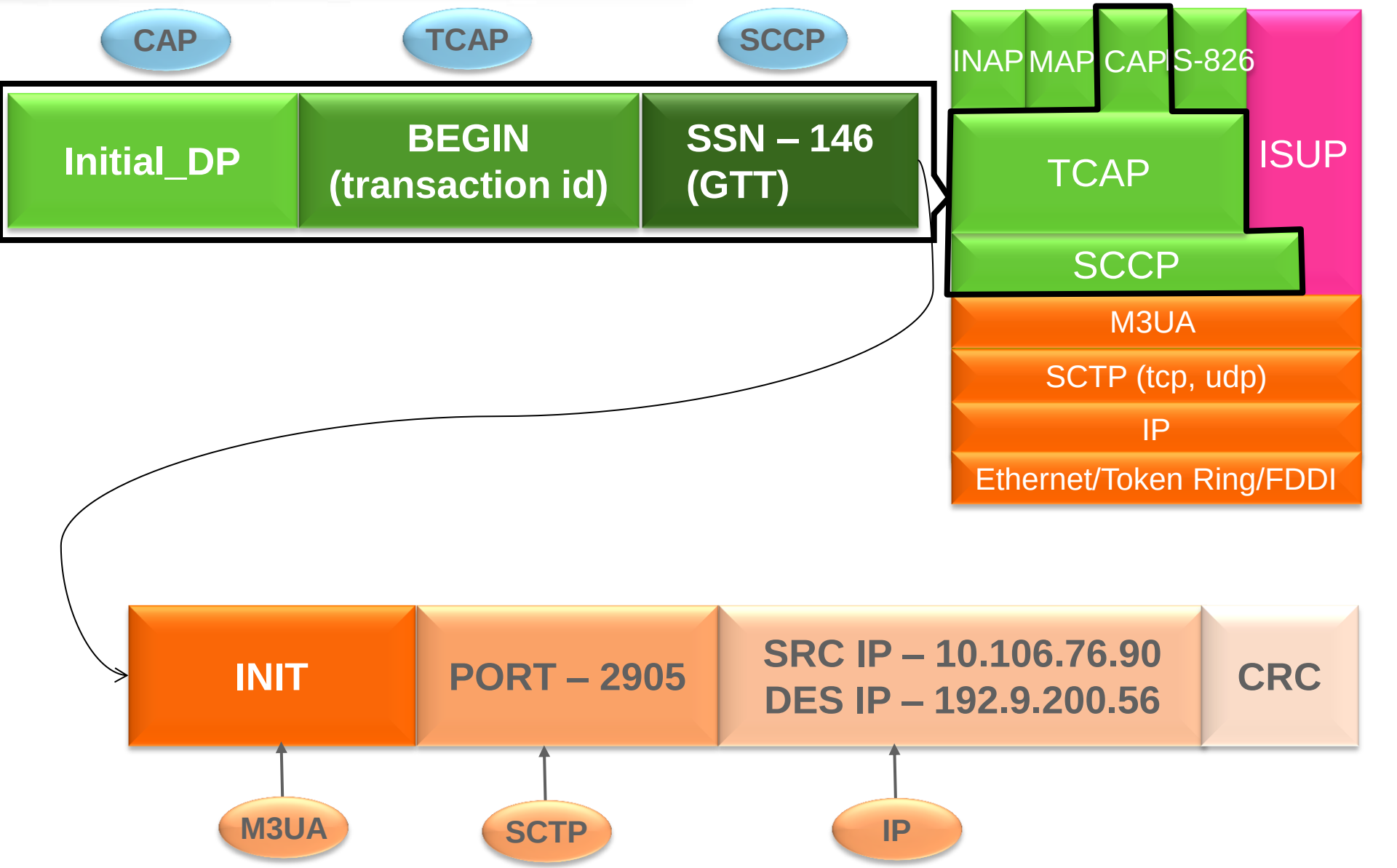
TS 16

64 kbps

PCM30



SIGTRAN Implementation



Review Question – 4

Select the correct answers to the following questions.

A protocol used for voice circuit switching:

1. TCAP
2. ISUP
3. IN (intelligent networks)
4. SIGTRAN

For transporting SS7 over IP you use:

1. MTP-1
2. MTP-3
3. IN (intelligent networks)
4. SIGTRAN

What does the SCCP use in order to deliver a message to a specific application within a signaling point?

1. Destination point code
2. Port number
3. SSN (Subsystem Number)
4. IP number

Summary

This lesson has covered the following topics:

- Signaling and its importance to Comverse ONE
- Signaling network entities:
  - SSP, STP , SCP
- SS7 protocol stack
- Message structure

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