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**

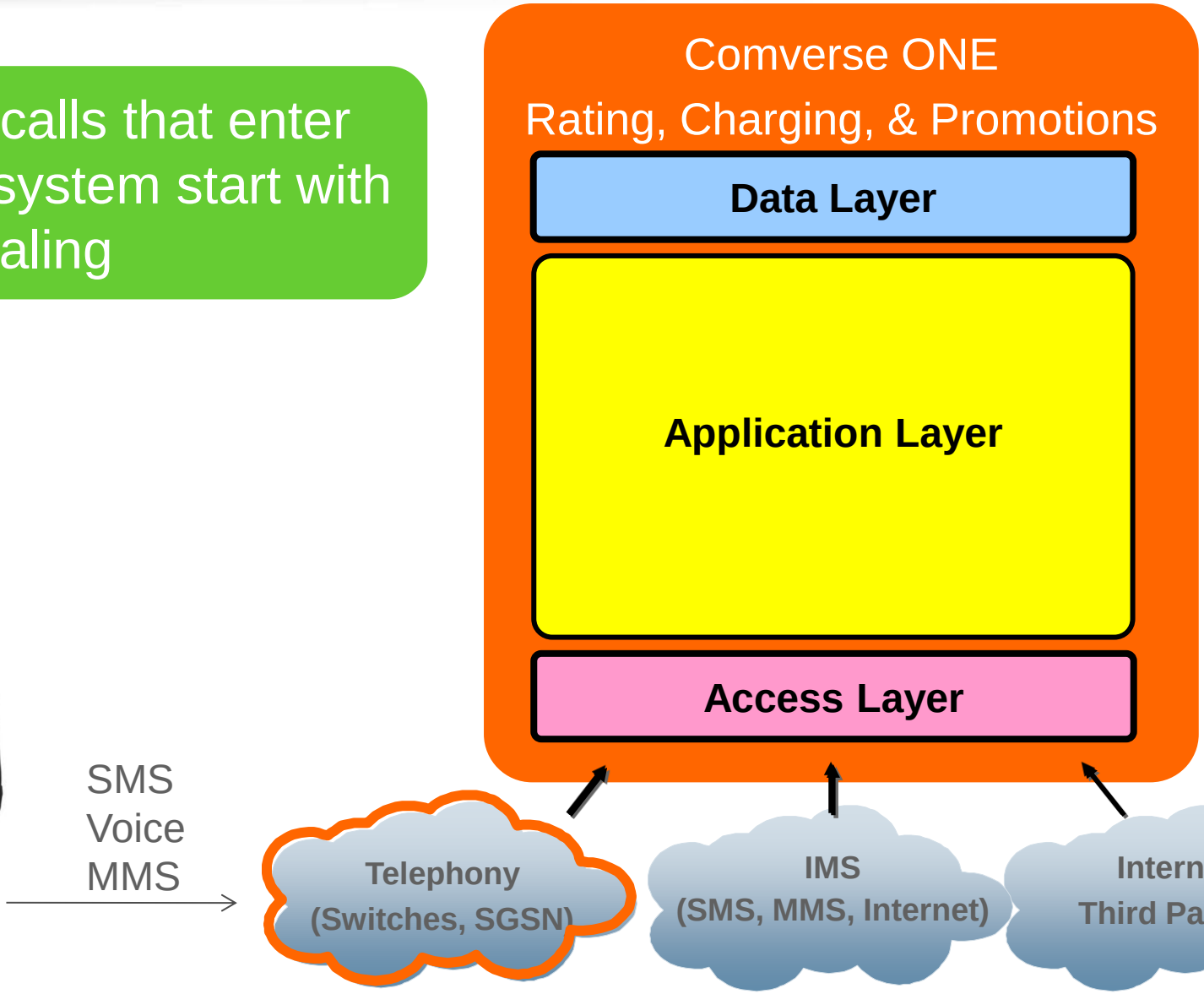
**Signaling Protocols**

**SS7 Message Structure**

# SS7 and Comverse ONE

Most calls that enter the system start with signaling

SMS
Voice
MMS

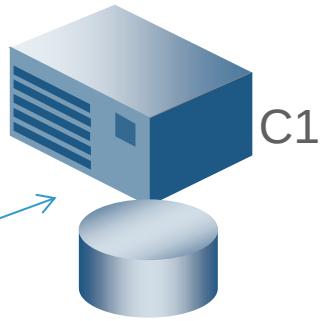


# Importance of Understanding SS#7

**Deployment**

How to connect and configure

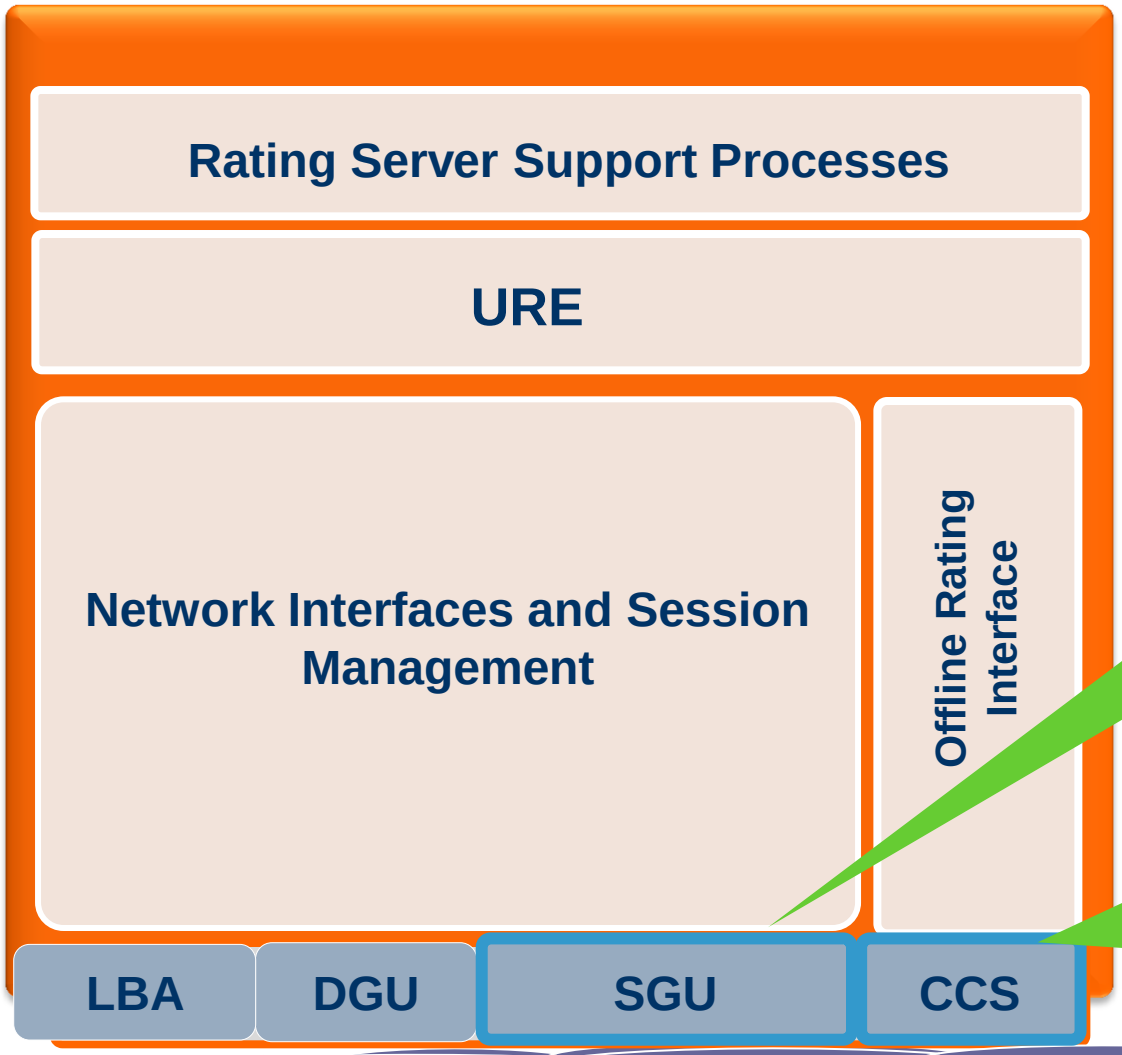

SS#7




**Support**

Understand the communication

# Comverse ONE Components that Handle SS7




**Signaling Gateway Unit (SGU)**

Accepts and balances signaling traffic

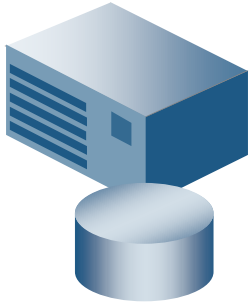
**Call Control Server (CCS) –**

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

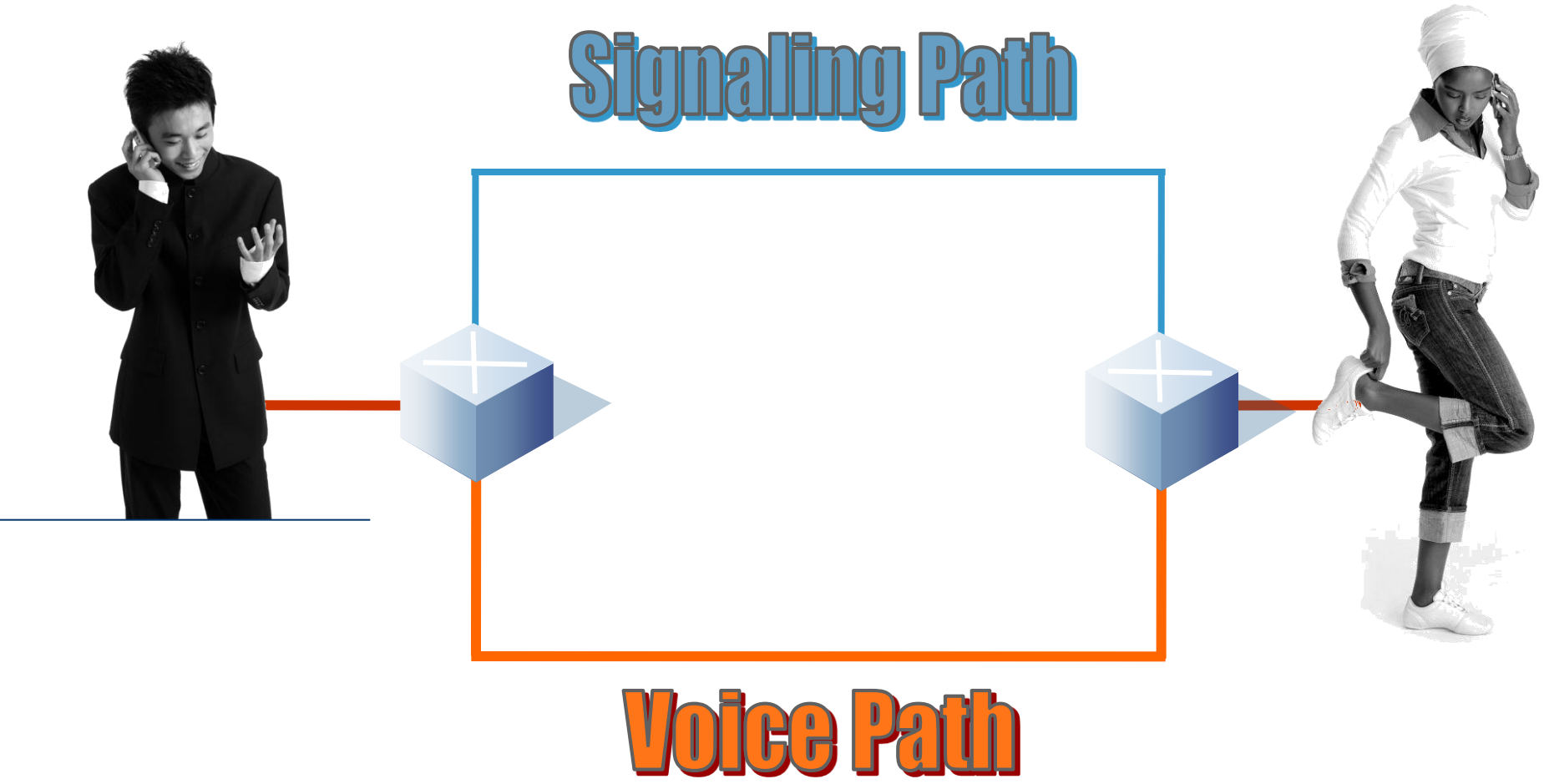
Voice session

On-Hook

Call Completed

Signaling

# Call Paths



# Review Question – 1

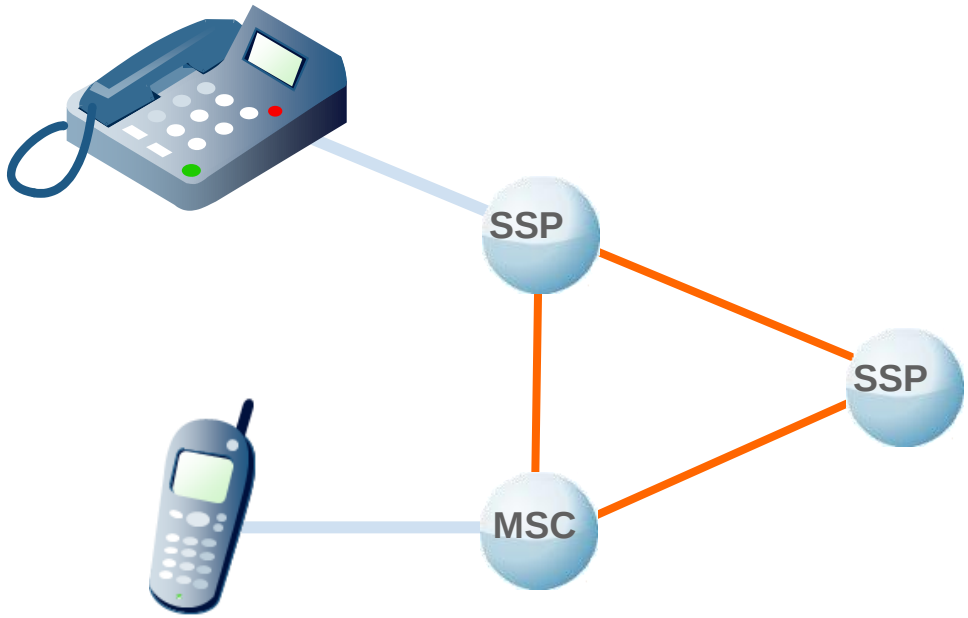
What information is not provided by the signaling path

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

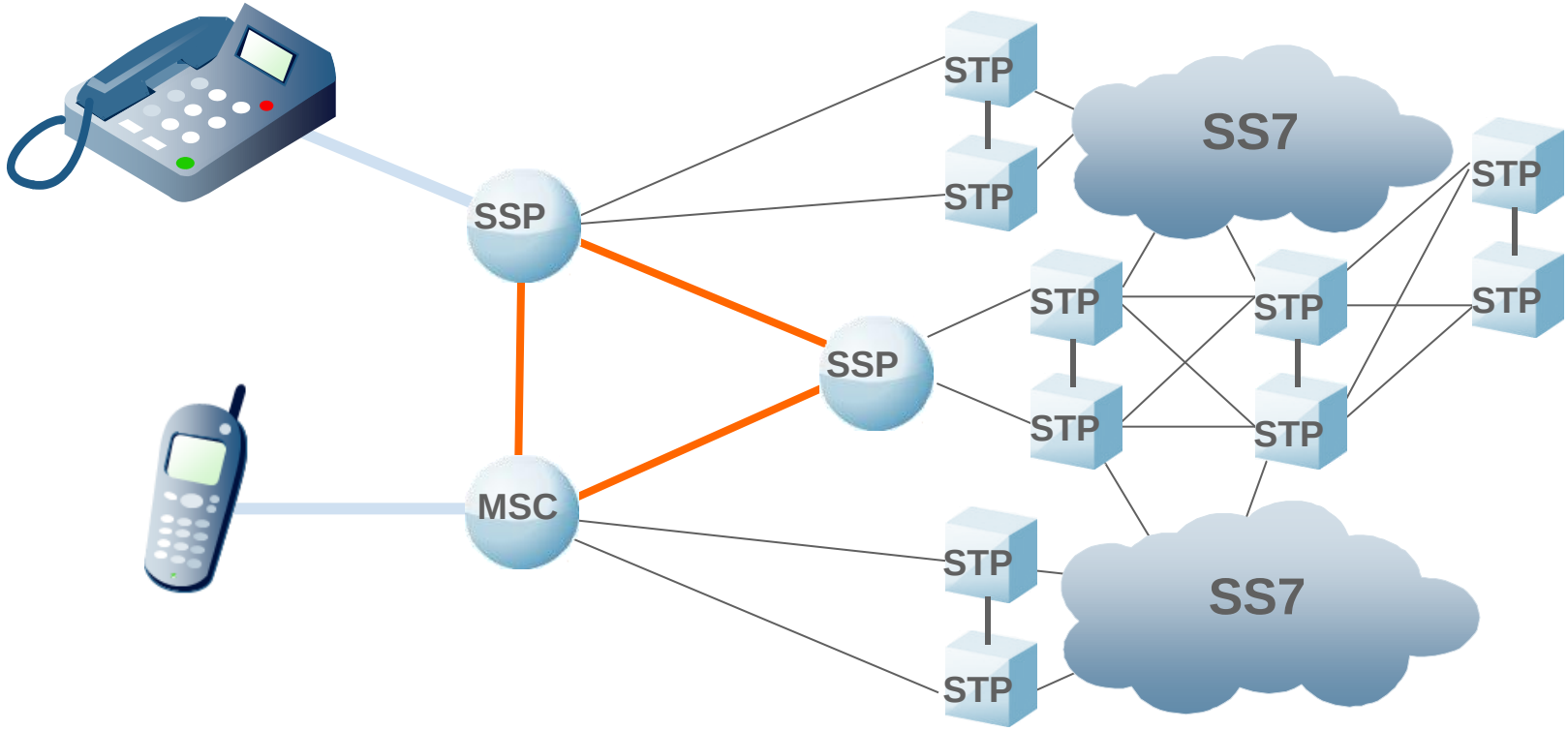
# Service Switching Point (SSP)




**SSP/ MSC**

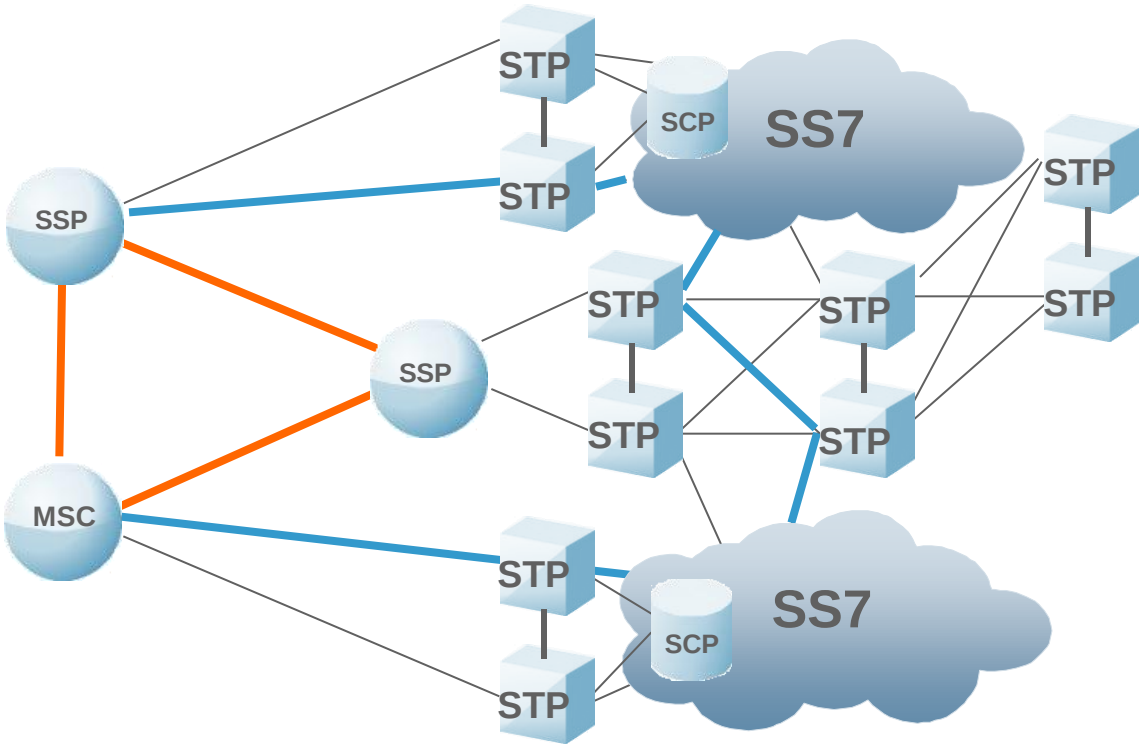
- Originate, terminate or transit calls
- Point-to-Point switch

# Switching Transfer Point (STP)

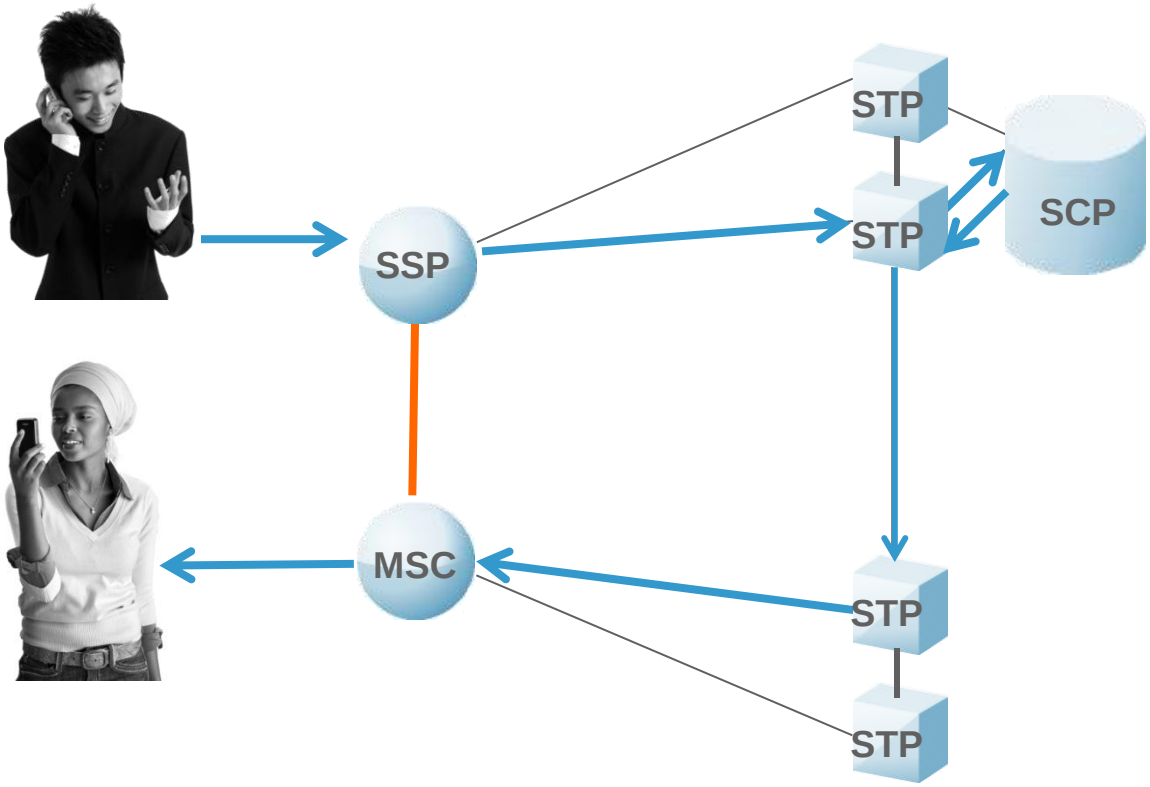



- Acts as a hub/messages router
- Improves utilization and reliability of network
- Eliminates need for direct links

# Signaling Control Point (SCP)

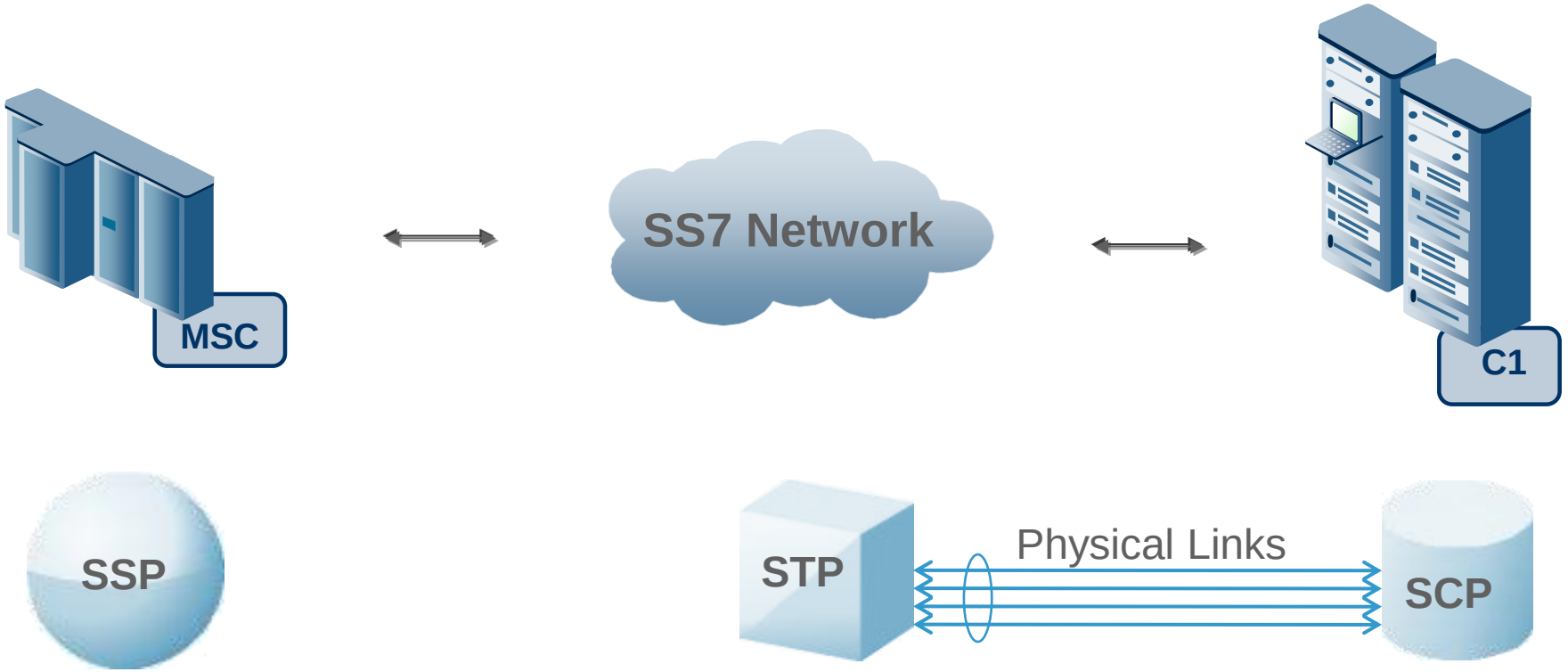


# SCP




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

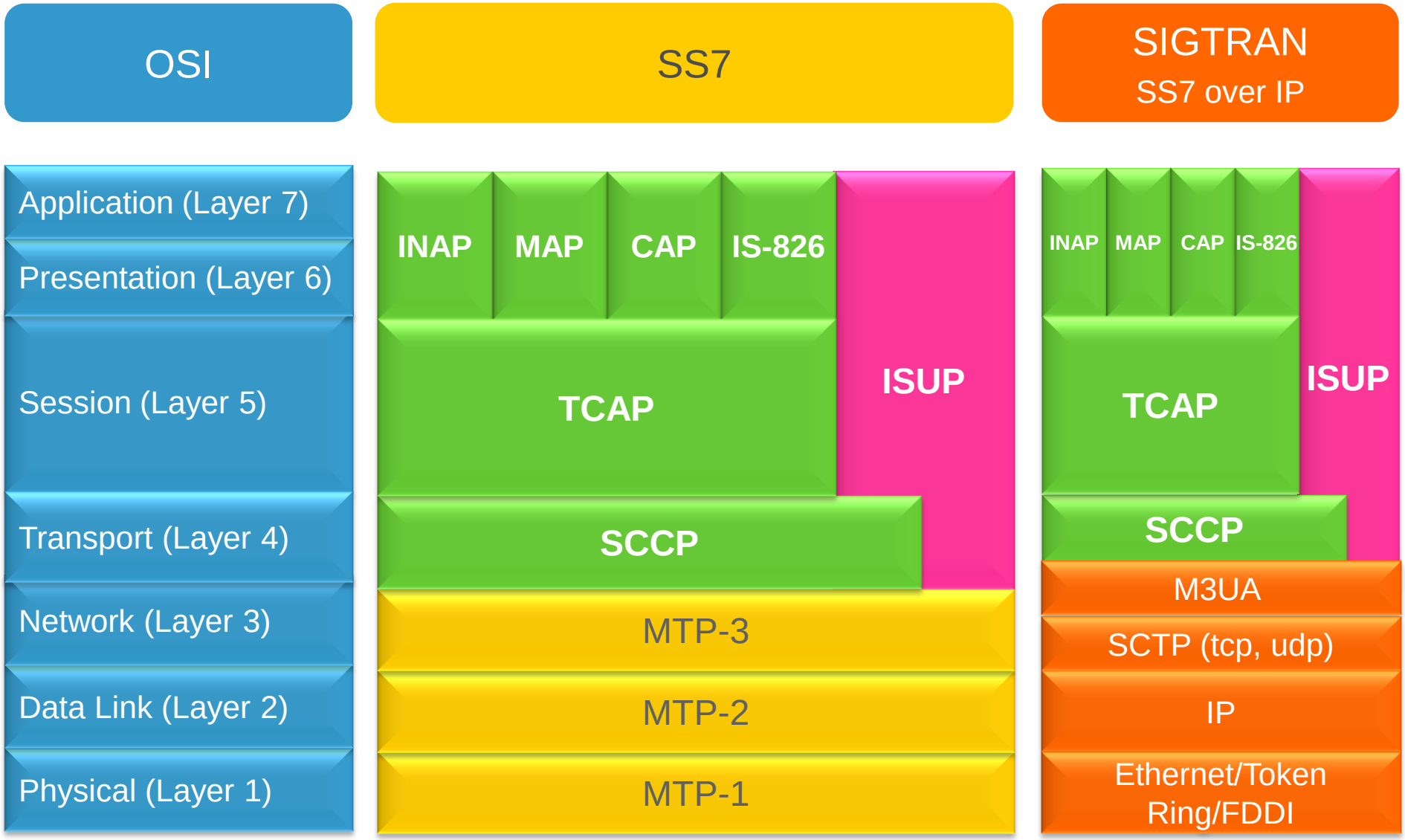
In the SS7 network, Comverse ONE acts as:

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

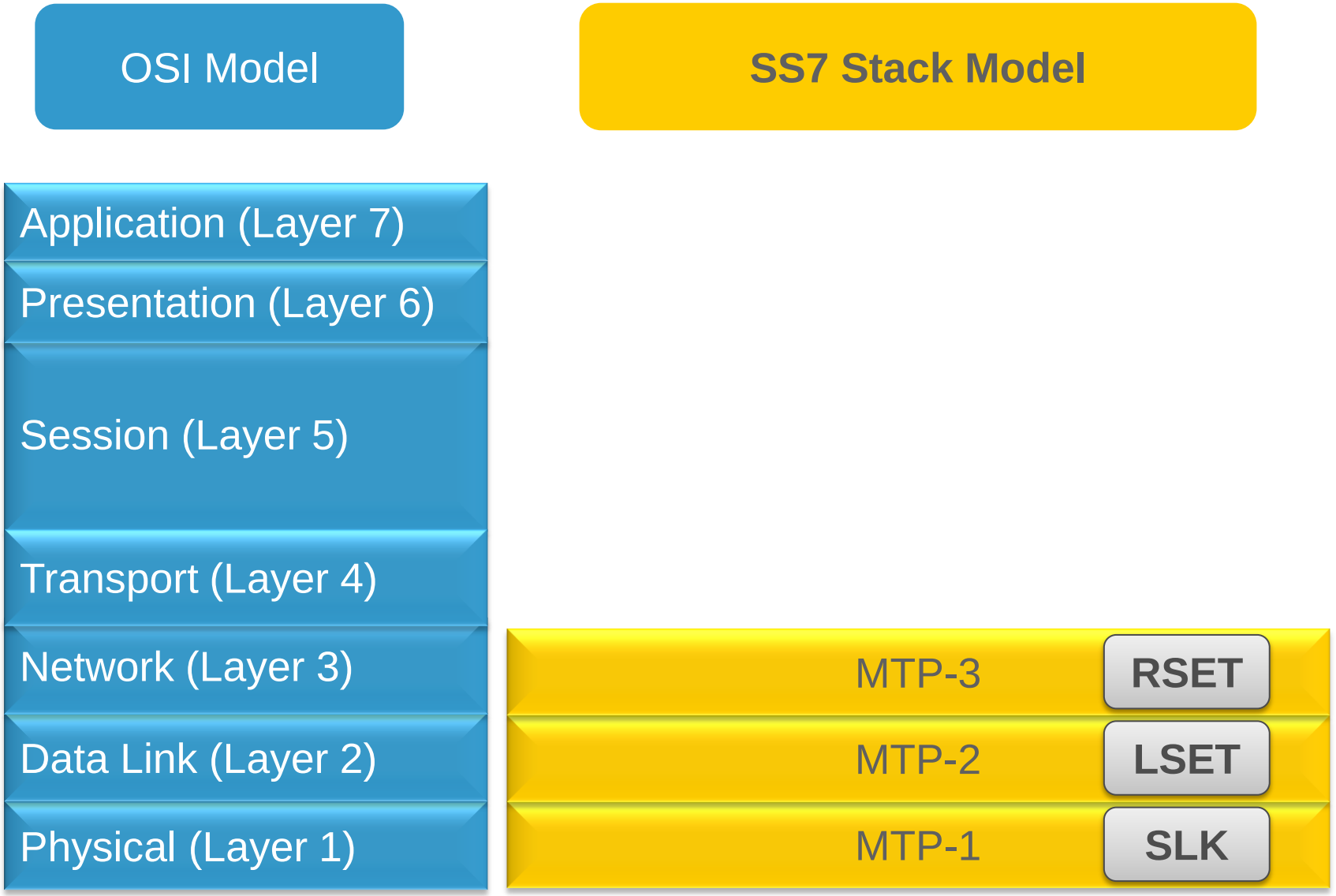
# Agenda

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

# SS7 Protocols Stack and OSI

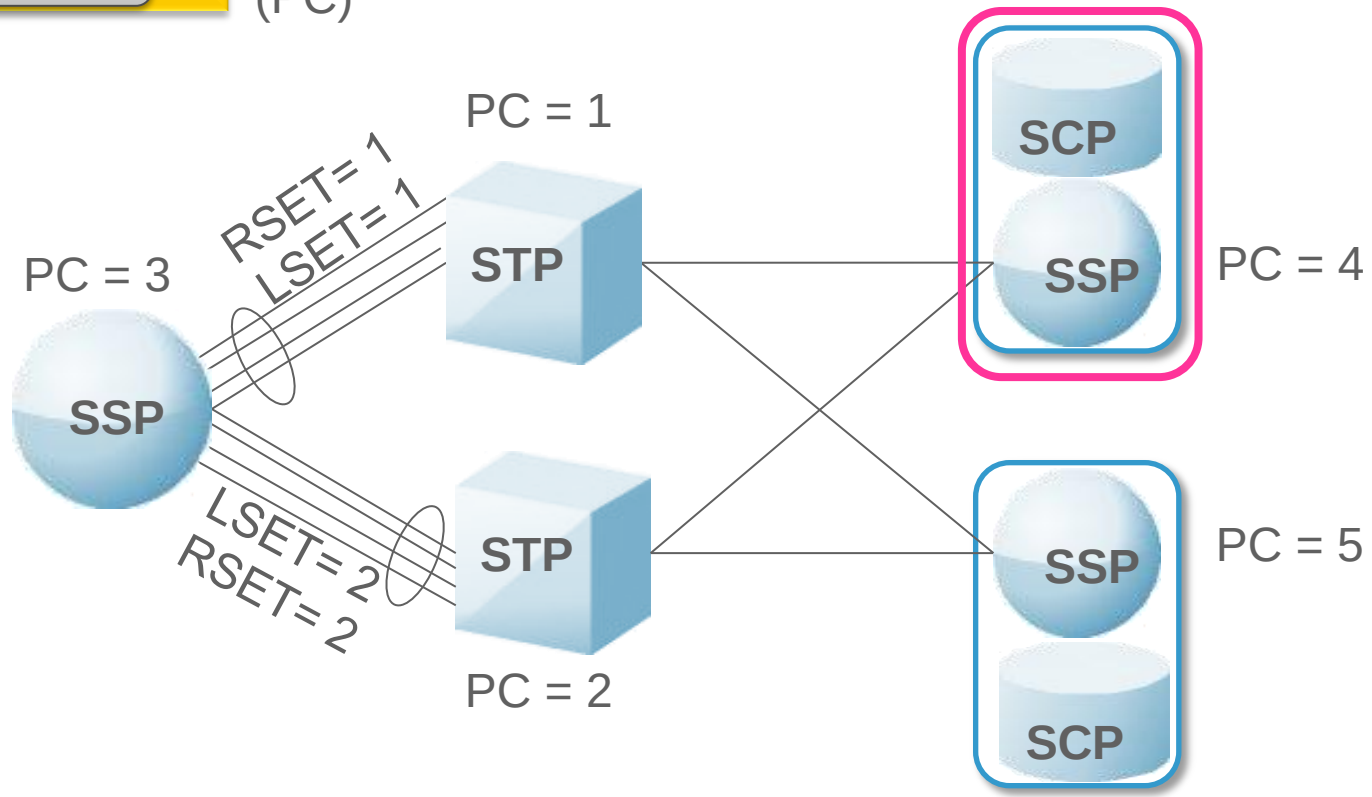


# SS7 Protocol Stack Model – Message Transfer Parts (MTP)

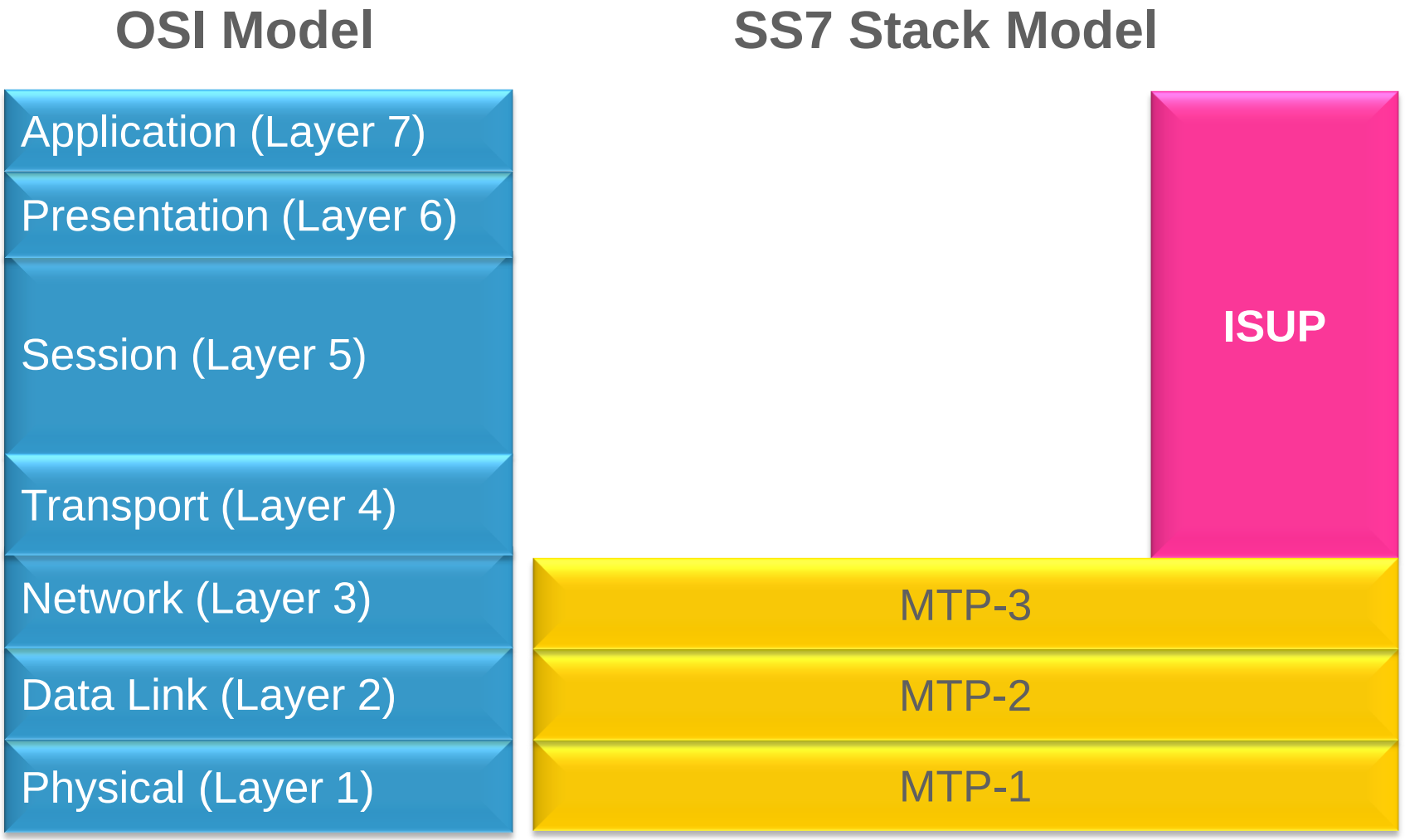


# Links, Linksets, Routes, and Routesets

| | | |
|---|---|---|
| **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) |

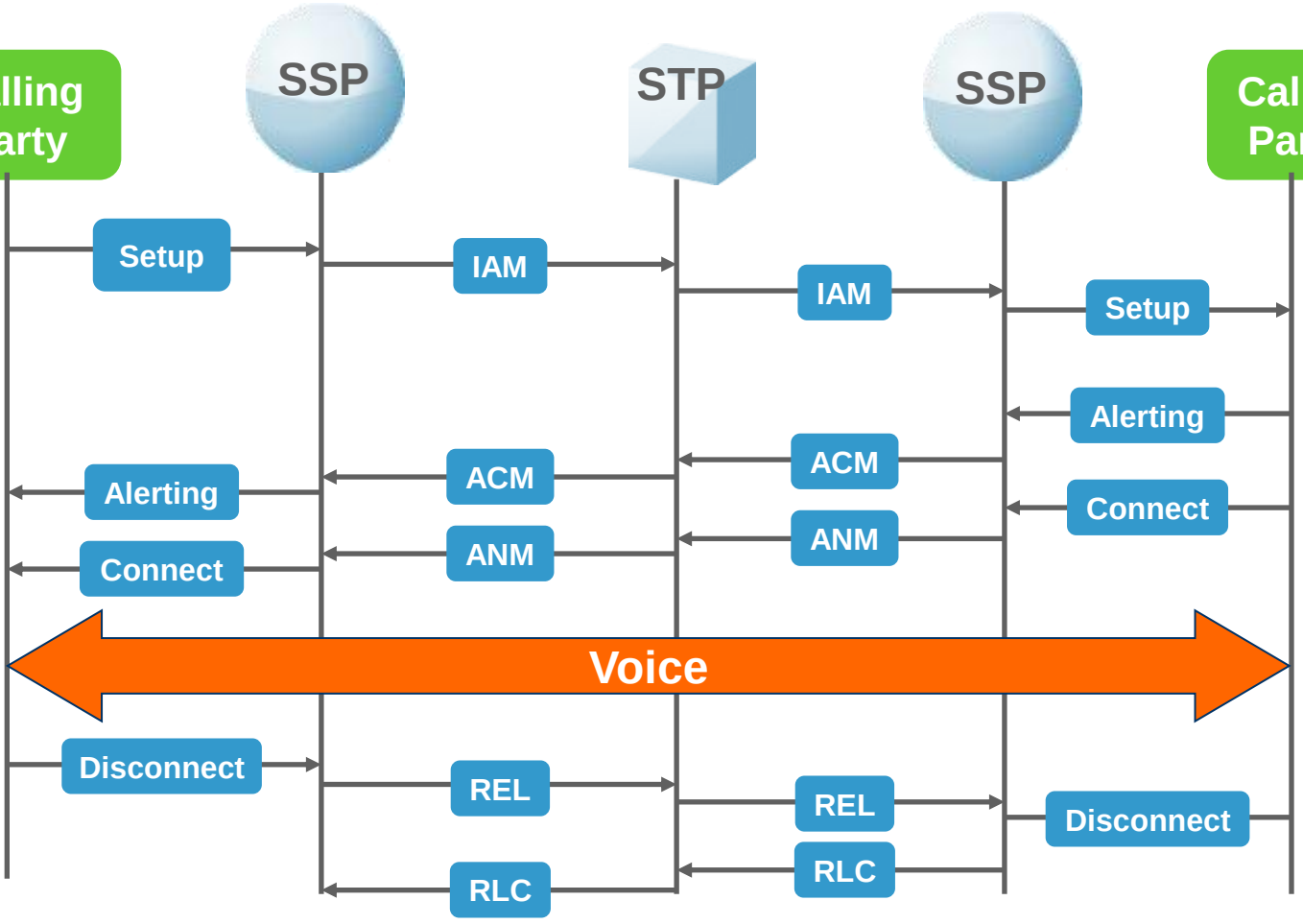


# The ISDN User Part (ISUP)

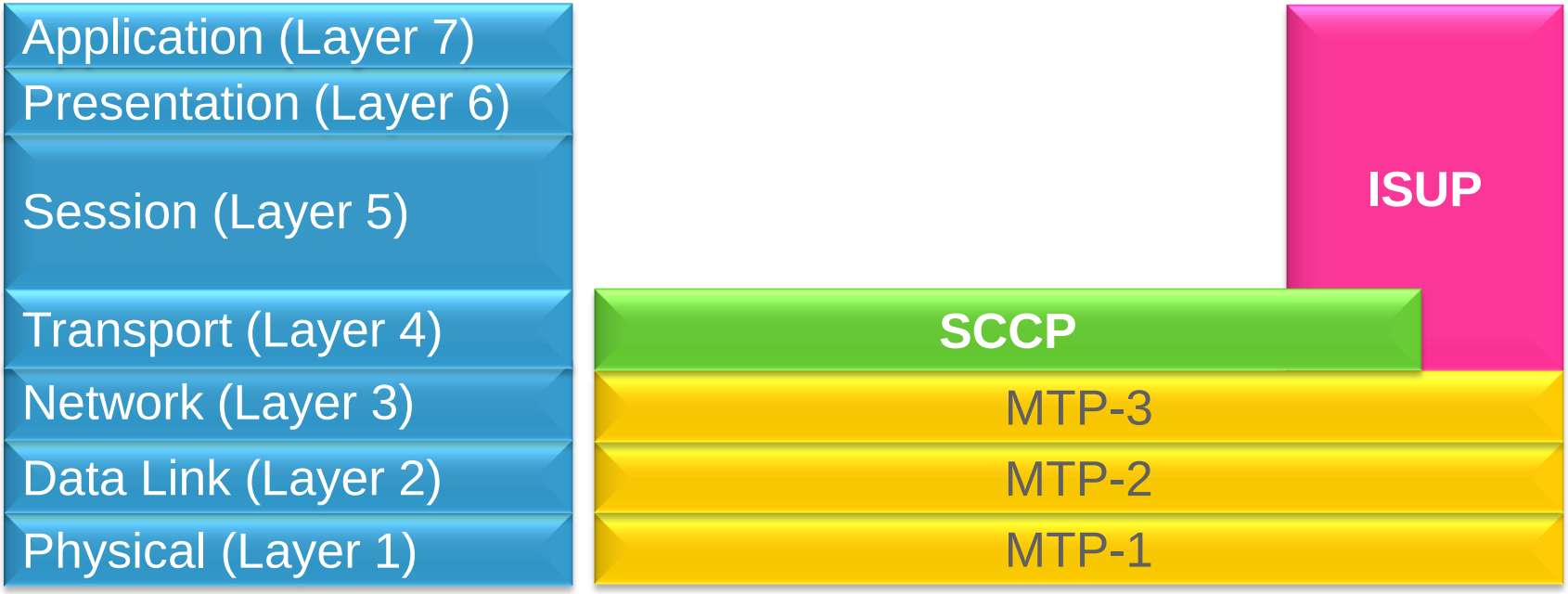


# Typical ISUP Call Control

## Example: Basic Call Setup/Teardown



# Signaling Connection Control Part (SCCP)

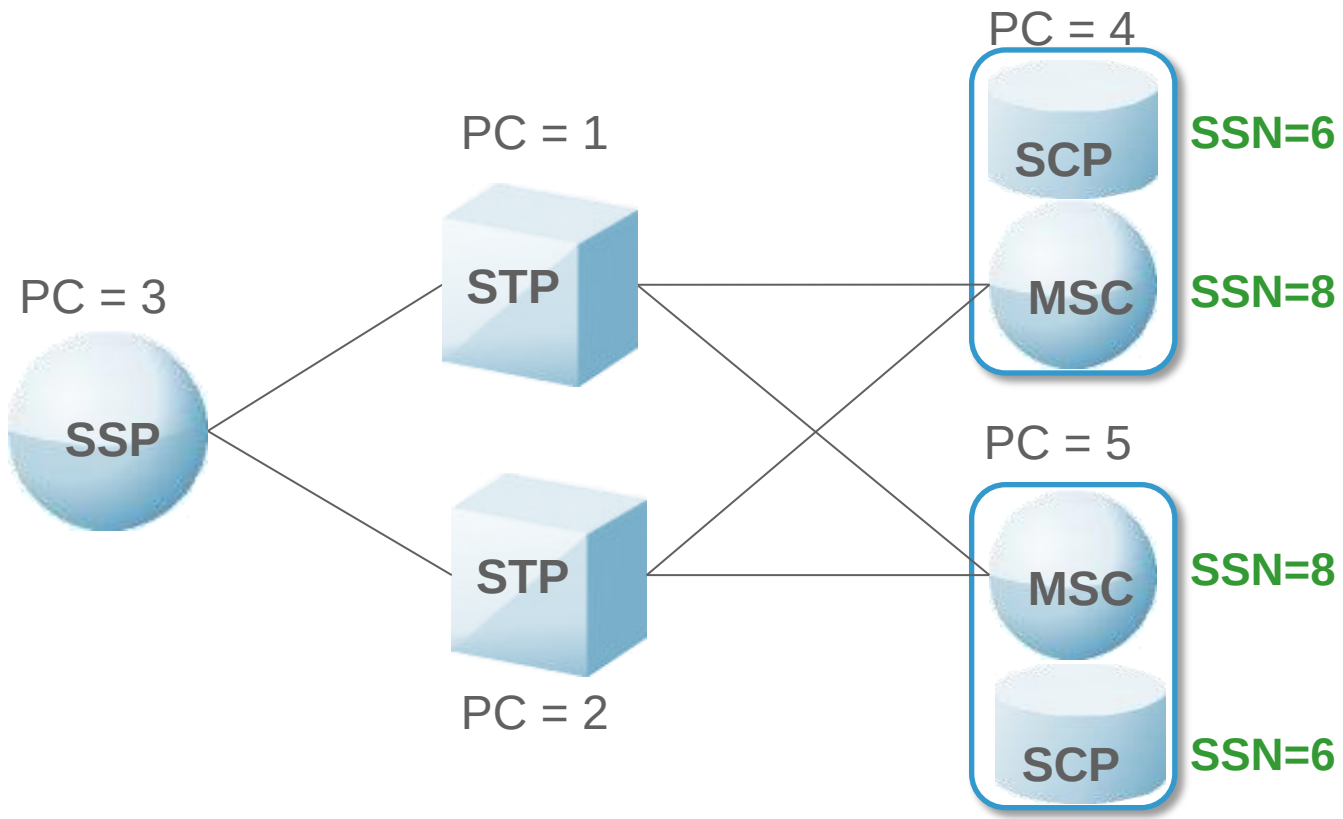


# Signaling Connection Control Part (SCCP)

SCCP enables:

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

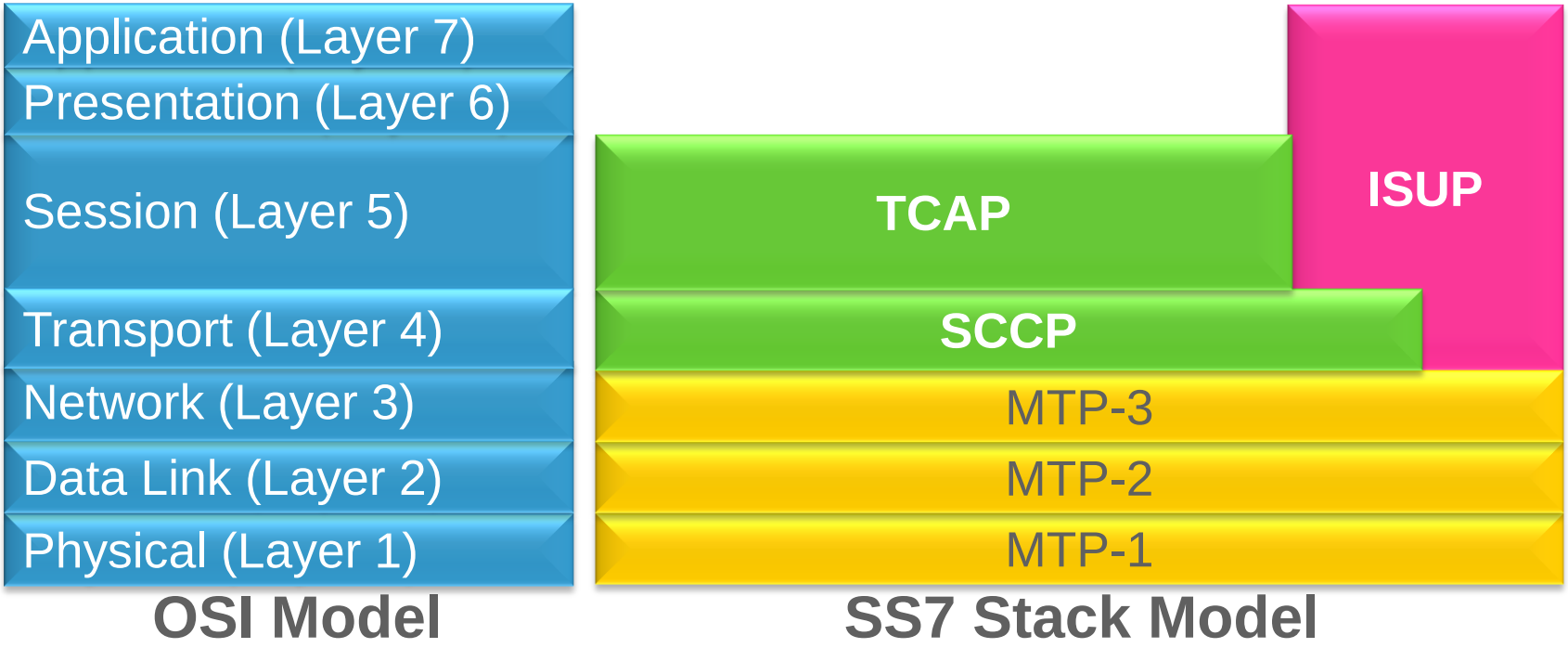
| Area code | Operator prefix | Line number |
|---|---|---|
| 712 | 354 | 3234 |



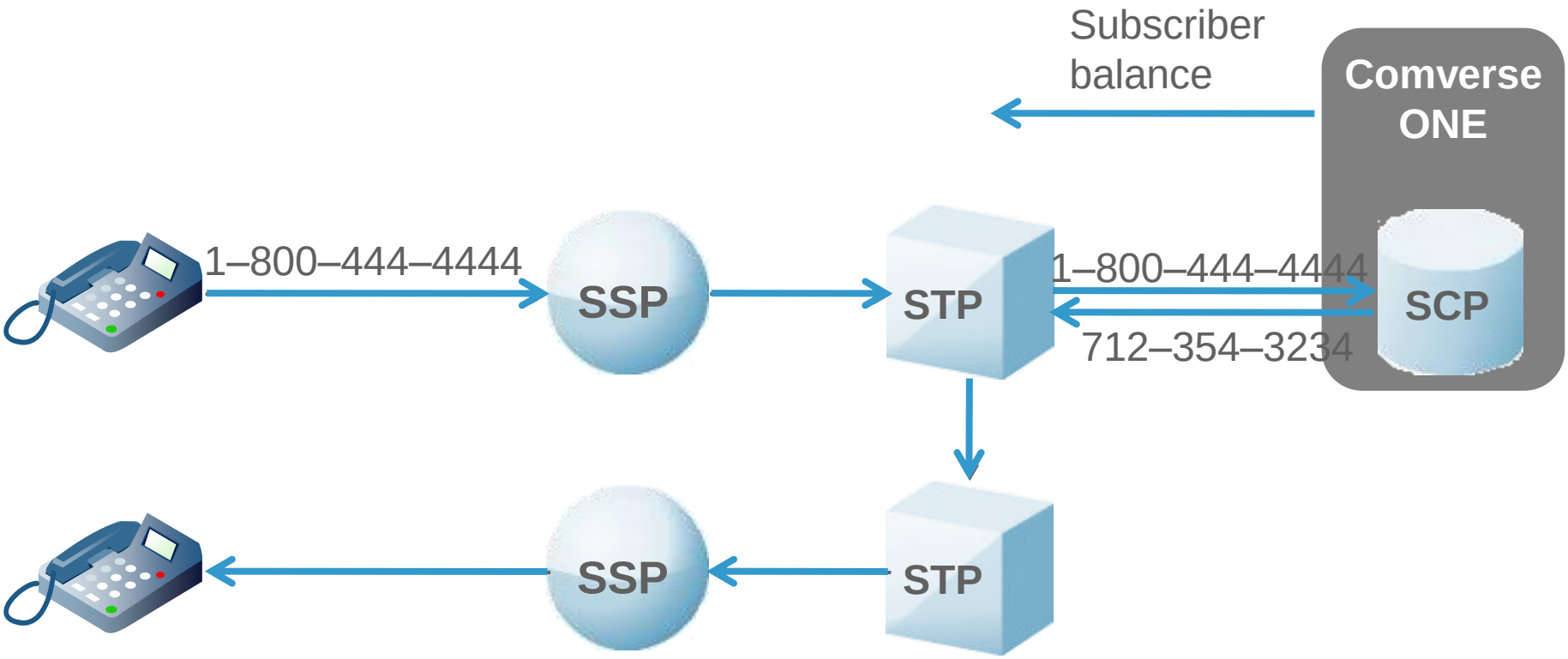
# Transaction Capabilities Application Part (TCAP)

TCAP functions:

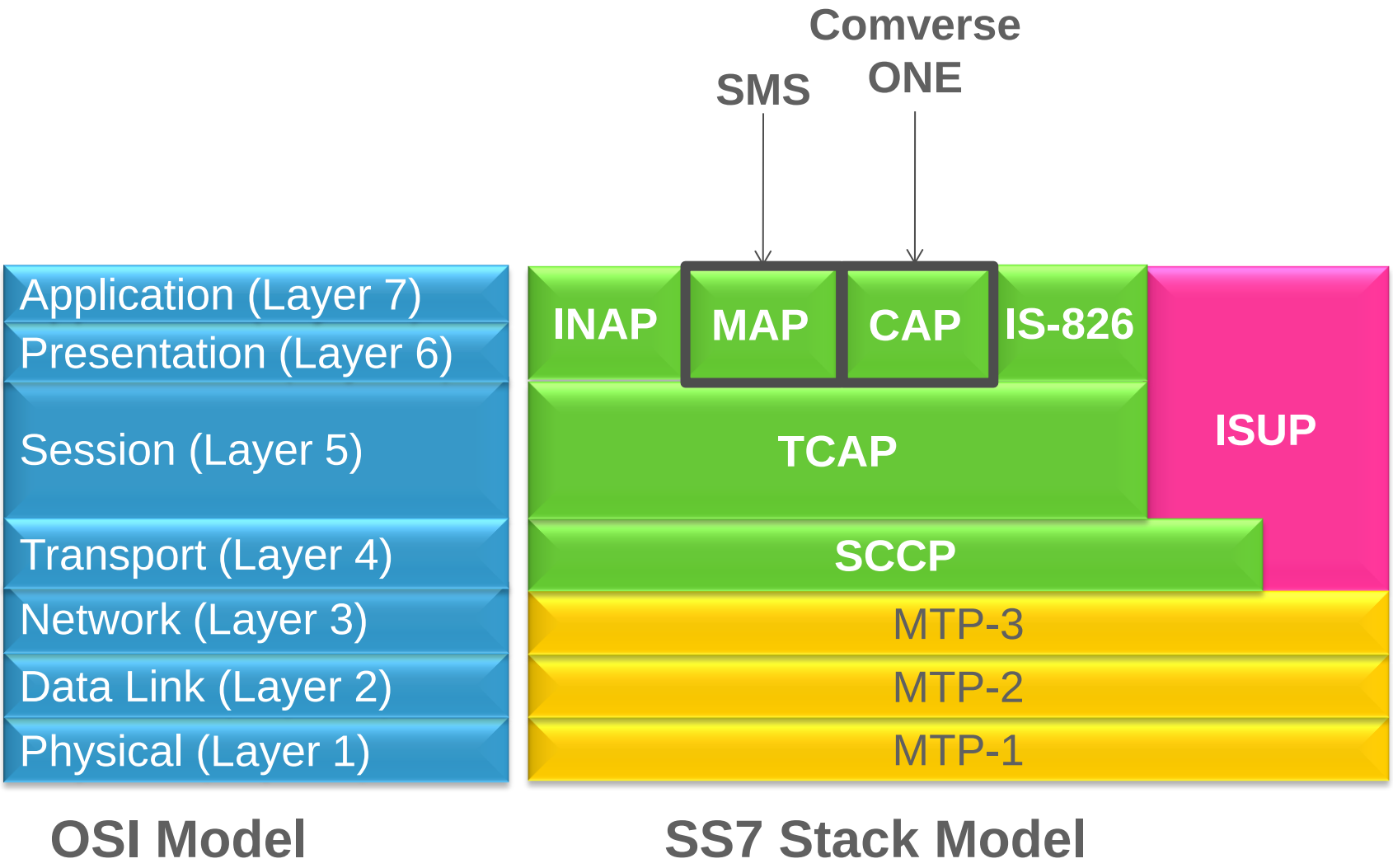
- Data transfer capabilities
- Database services



# IN and Database Usage



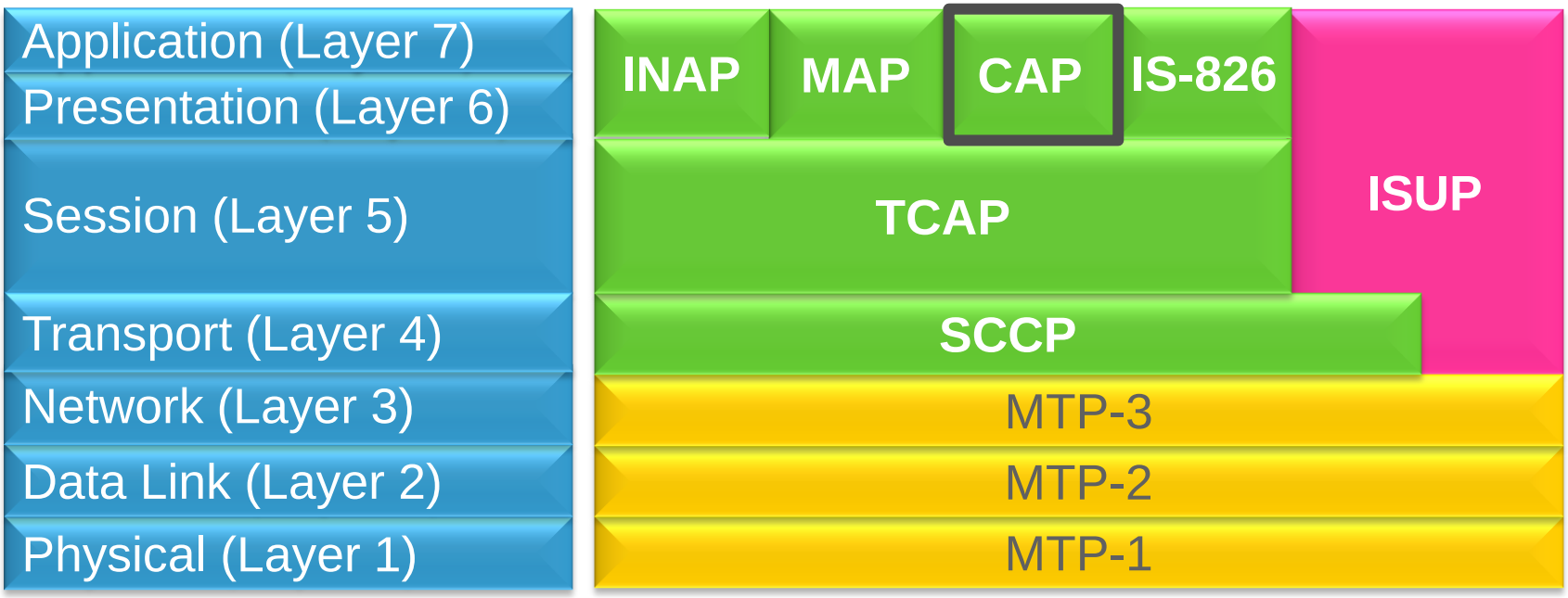
# Application Layer



# CAMEL Application Part (CAP)

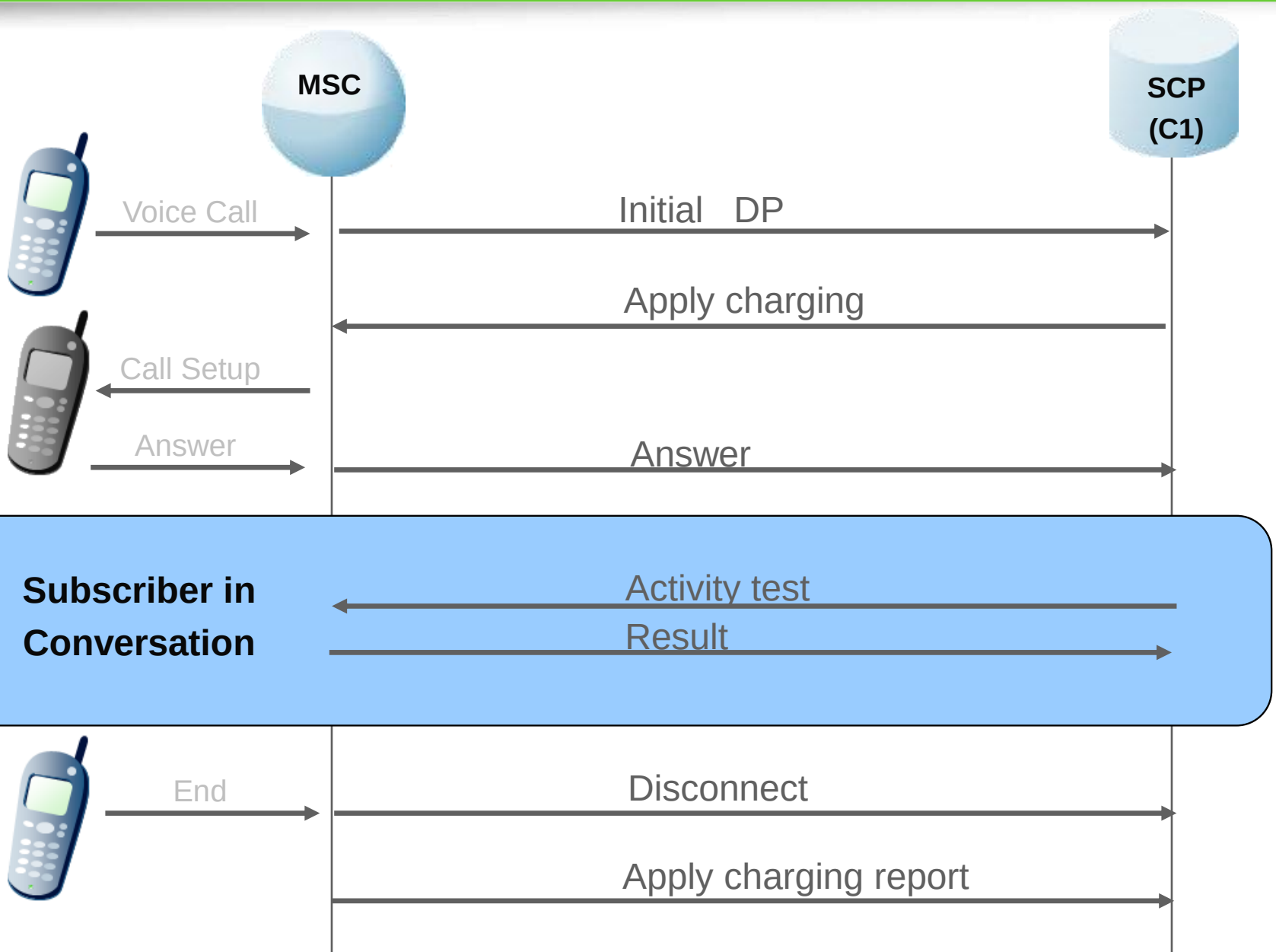
CAMEL Application Part (CAP) :

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

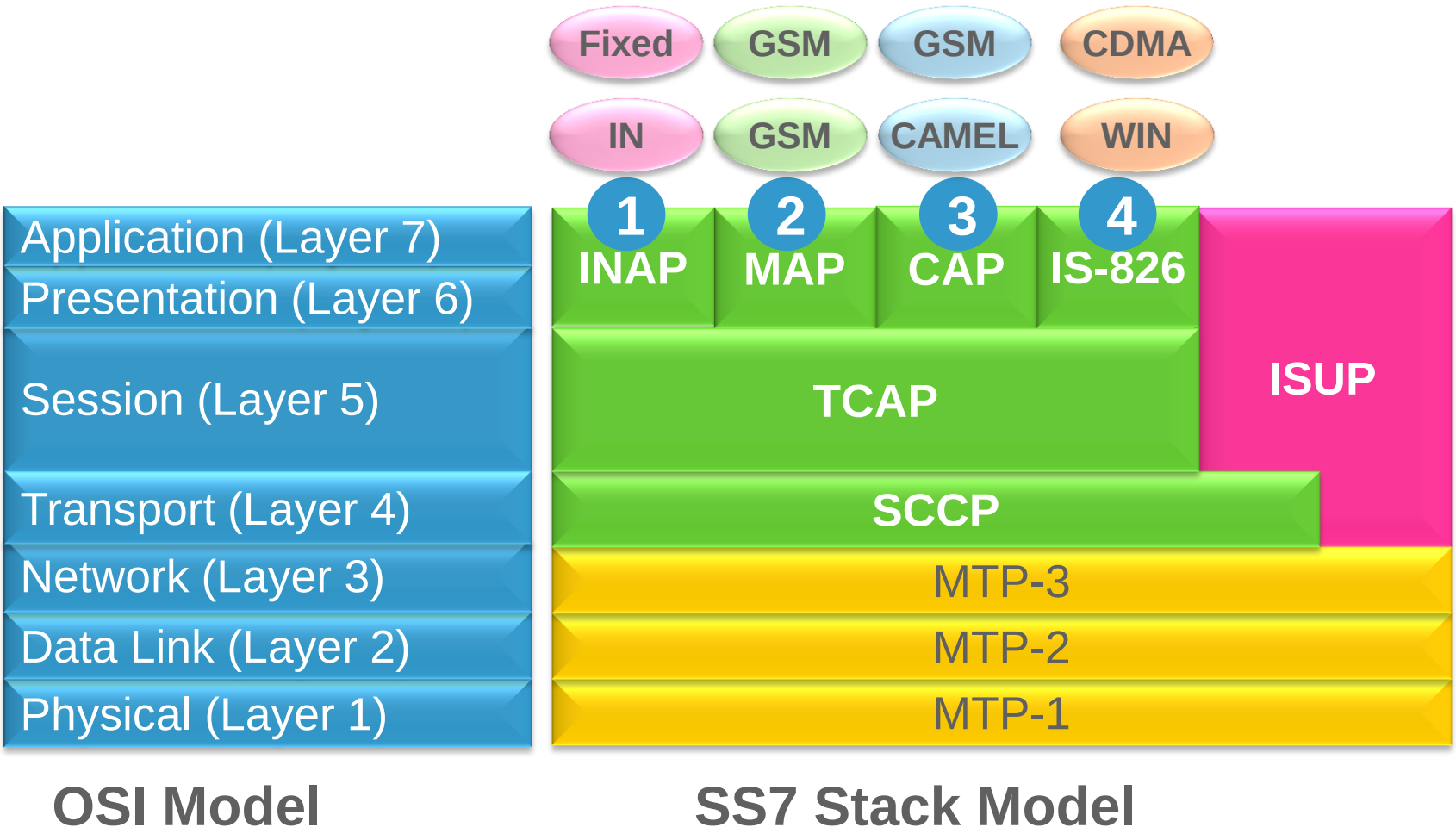



**OSI Model** **SS7 Stack Model**

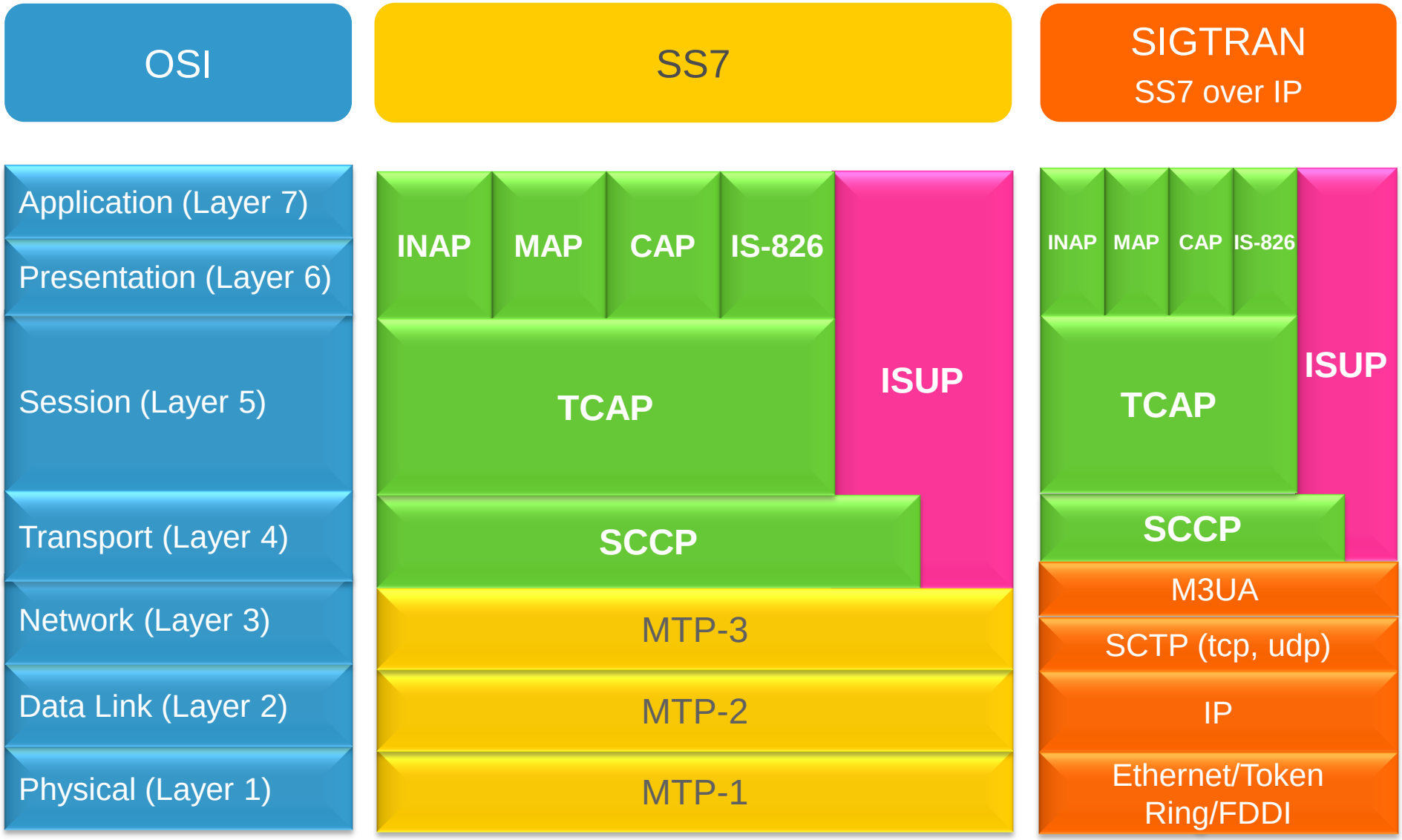
# Voice CAP2 Call Flow – Comverse ONE Example



# Application Layer



# SS7 Protocols Stack and OSI

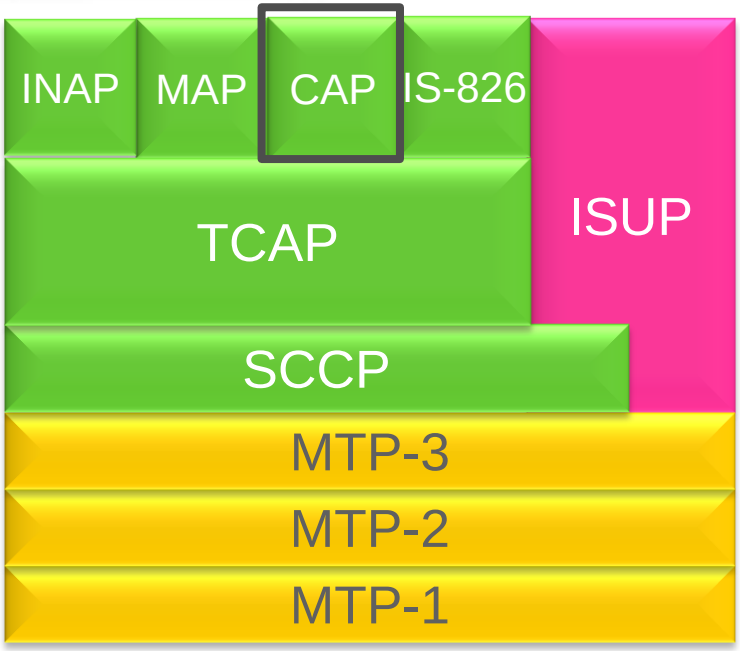


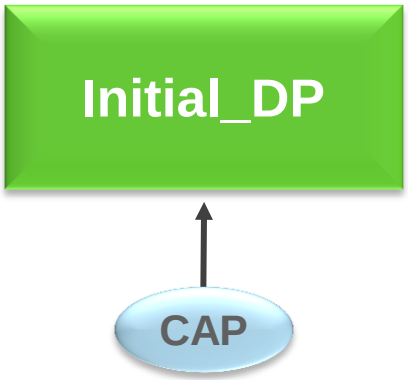
# Agenda

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

# Application Layer (CAP)

The message bits as created by CAP

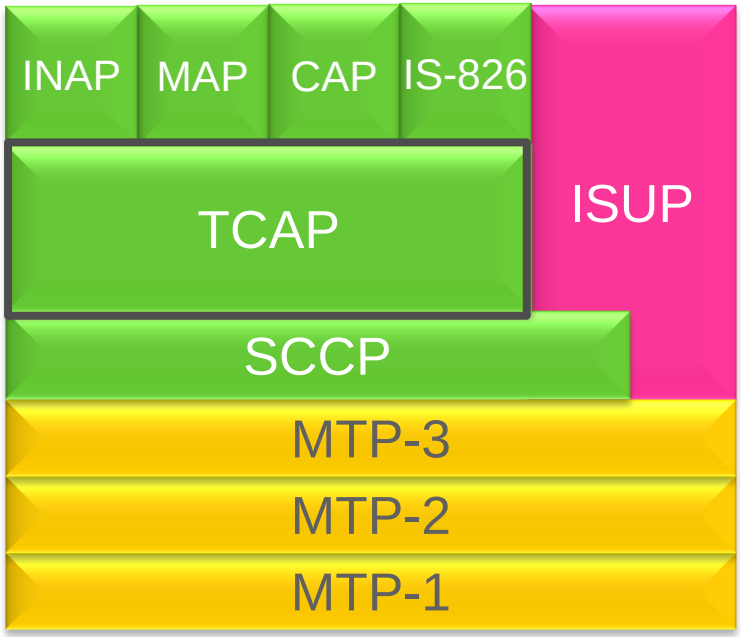


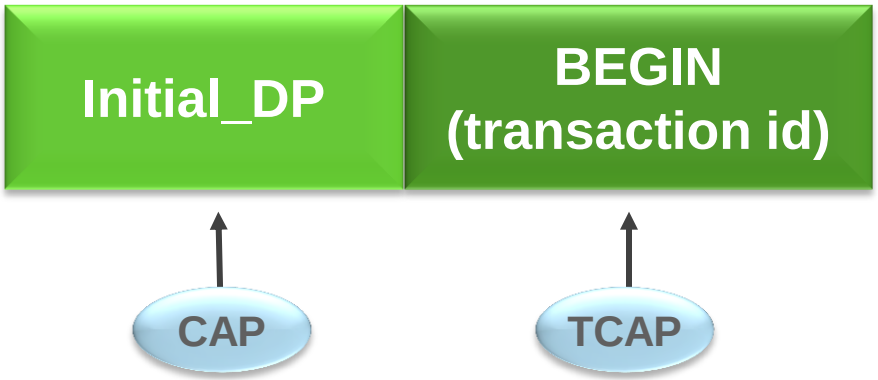



# Session Layer (TCAP)

Transaction Capabilities Application Part (TCAP):

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

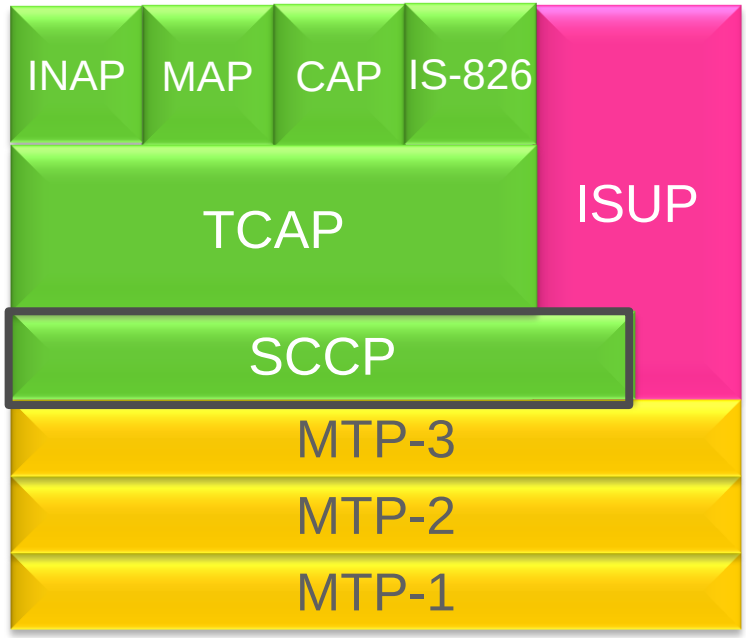


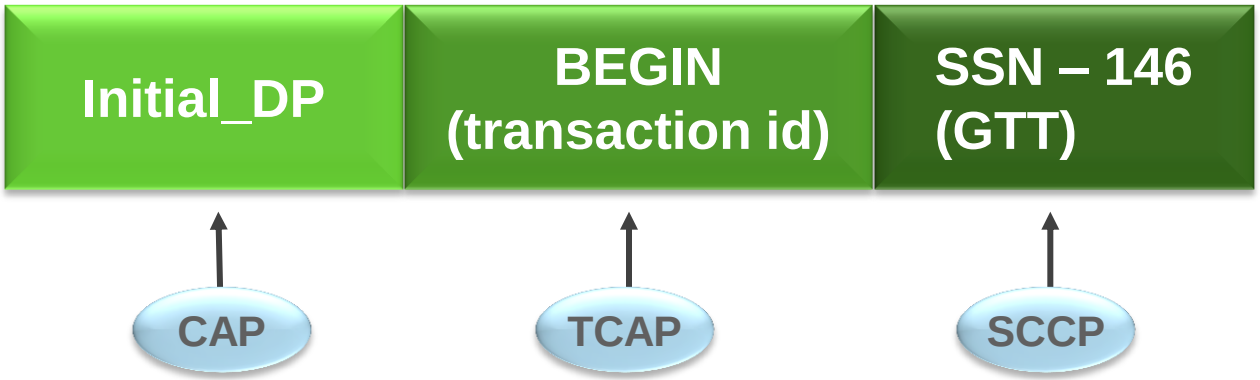



# Transport Layer (SCCP)

Signaling Connection Control Part (SCCP):

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

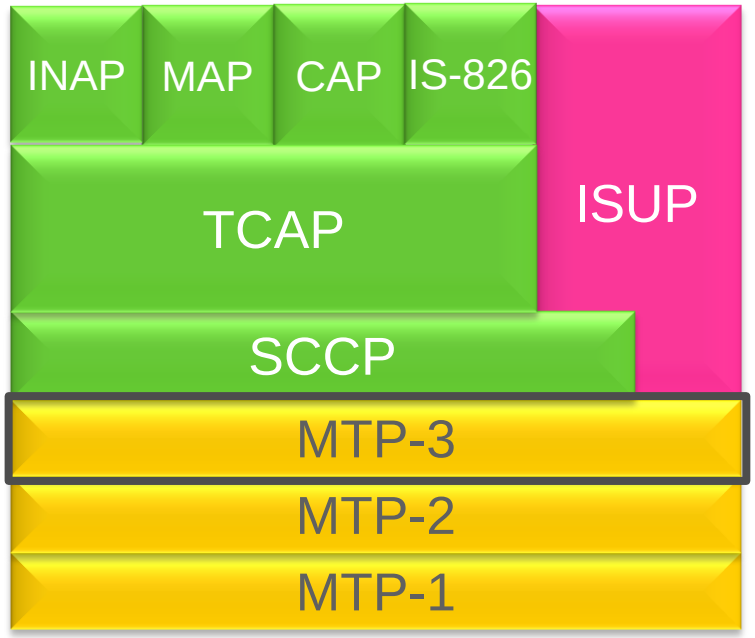


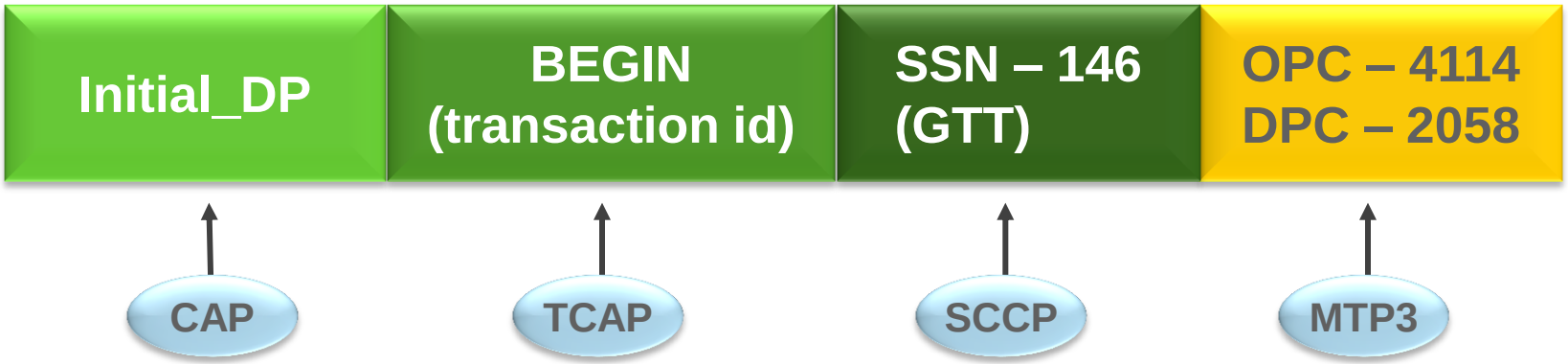



# Network Layer (MTP-3)

Message Transfer Part 3 (MTP3):

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

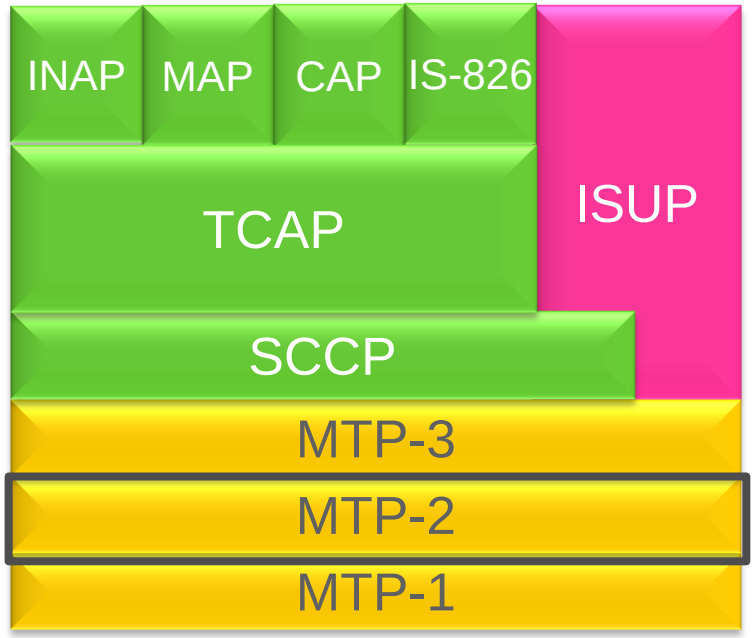


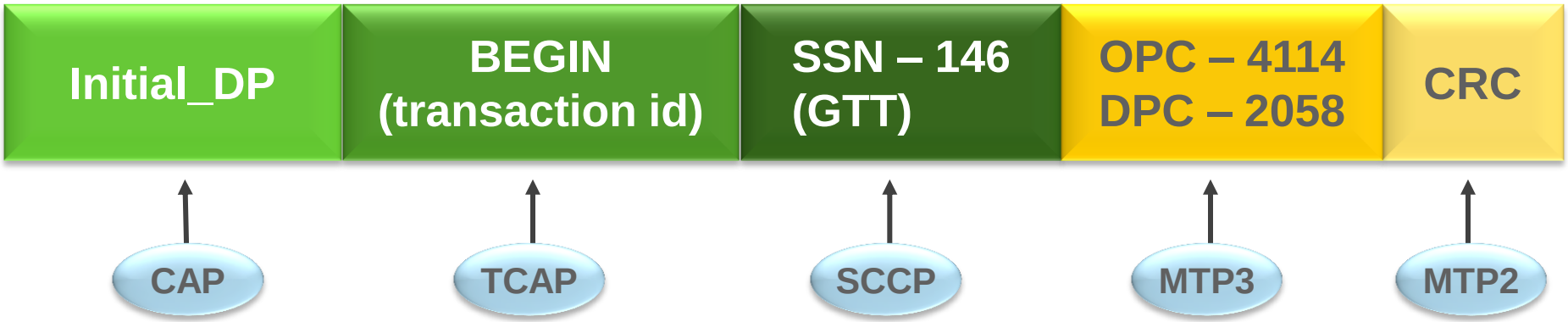



# Data Link Layer (MTP-2)

Message Transfer Part 2 (MTP2)

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

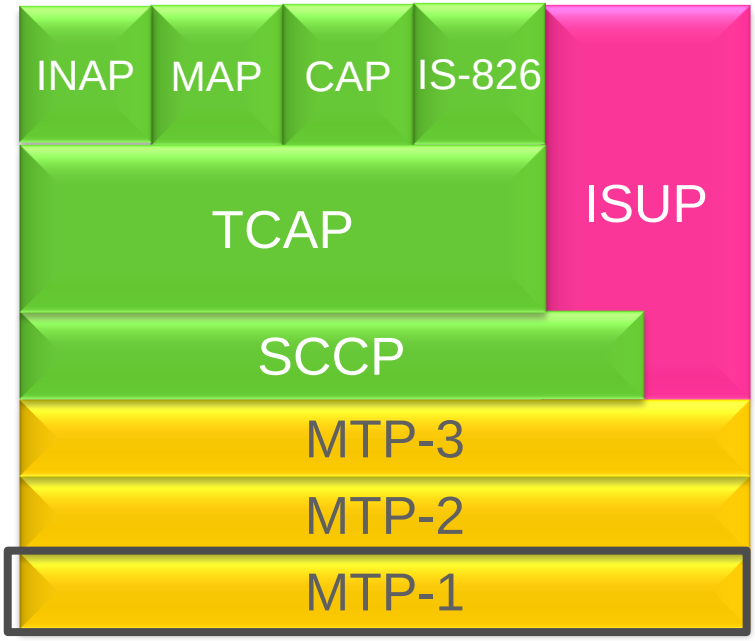


# Physical Layer (MTP-1)

## Message Transfer Part 1 (MTP1):

- Defines the physical and electrical characteristics of the signaling links

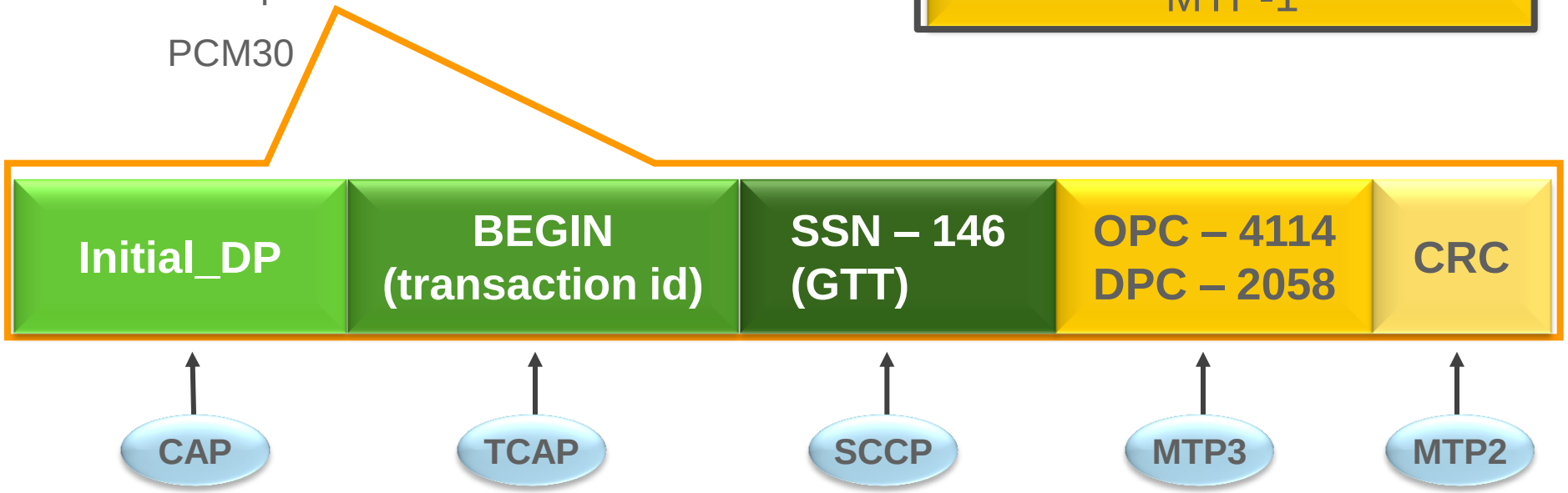



E1 num 6.

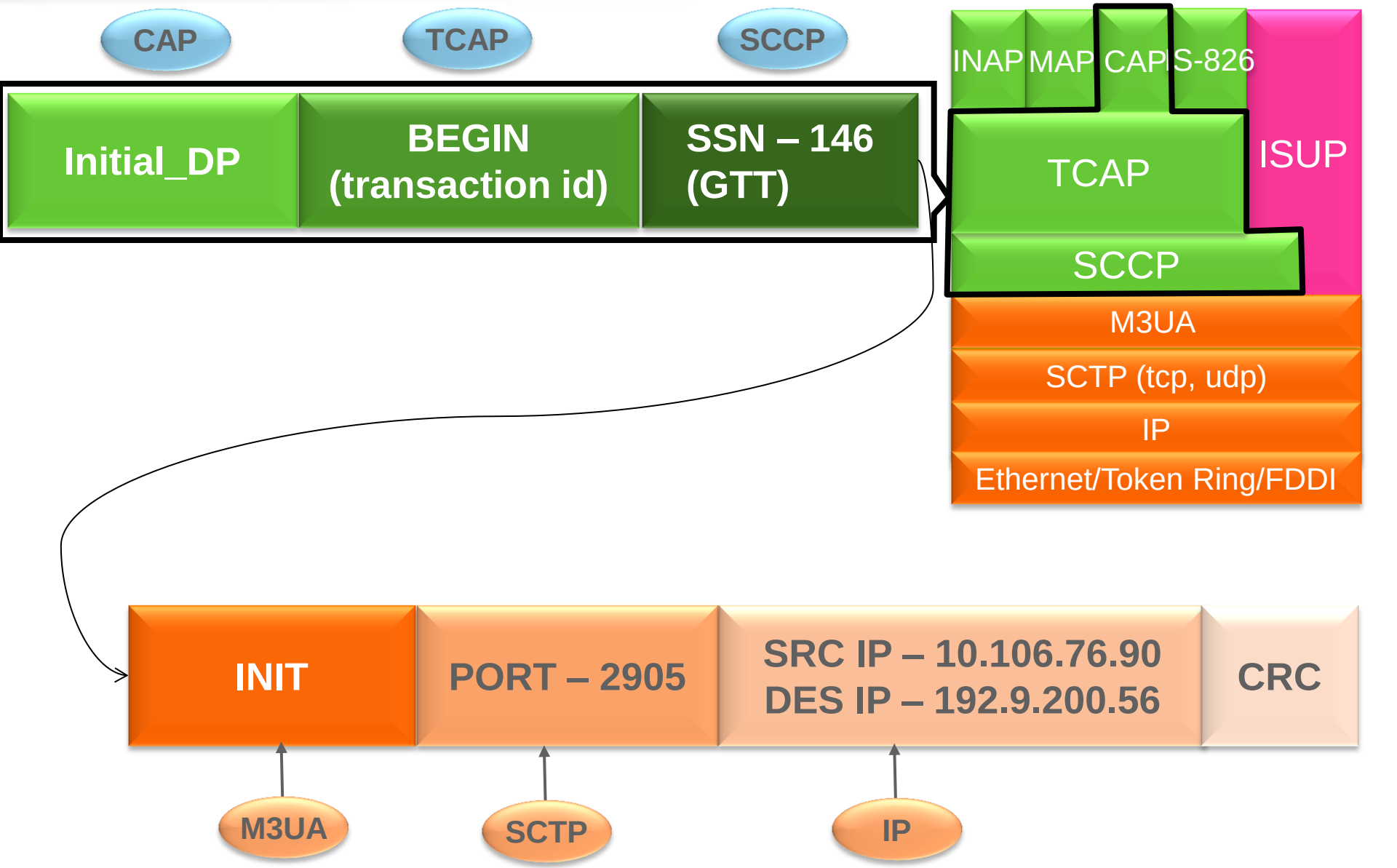
TS 16

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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