Intelligent Networks (IN)

- SSP sends a query to the SCP to require IN services and SCP replies with a response to the query.
- Aim of the INs is to eliminate the dependency of networks on switch manufacturers and try to introduce new advanced services.

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Service Data & Service Logic:
- Service Data: Information need to process a call or a feature.
- Service Logic: Decision-making algorithms implemented in software that determine how a service is processed.
- The expansion of telecom services created the following:
  1) Increase in storage demands.
  2) Synchronization of duplicated data.
  3) Administrative overhead.
- IN Benefits: Centralizes service data in small number of nodes.

Service Distribution & Centralization:
- IN has introduced 2 new nodes: SCP and Adjunct for hosting service data & service logic.
- SCP: serves a large number of SSPs.
- ADJUNCT: serves a small number of SSPs.
- The figure below shows 2 networks; one using IN processing and the other not using IN processing.
Intelligent Network Services:

- The two main drivers are:
  1) **Regulatory Mandates**: LNP is an example of regulatory mandates that have greatly expanded the use of IN.
  2) **Revenue-Generating Features**: Time Of Day (TOD) Routing, and Private Virtual (PVN) Networking provide solutions for everyday business needs are revenue generating services providers.

IN & the SS7 Protocol Stack

- With respect to SS7, the IN is an application that uses the SS7 protocol.
- The various IN versions are considered TCAP users functioning at level 4 of the SS7 protocol stack as shown in the figure below.
**Advanced Intelligent Networks (AIN):**
- AIN defines a Basic Call State Model (BCSM), which identifies the various states of call processing and the points at which IN processing can occur, Points In Call (PIC) and Detection Points (DP), respectively.
- **Points in Call (PIC):** The BCSM assigns a formal name, PIC, to each call processing state.
- **Detection Points (DP):** DPs between the various PICs represent points at which IN processing can occur. There are 2 types of DPs:
  1) **Trigger Detection Point (TDP):** When the TDP is encountered the SSP can set triggers to represent invocation of an IN service.
  2) **Event Detection Point (EDP):** An EDP is a point at which the SCP "arms" an event at the SSP to request that the SCP be notified when the particular EDP is reached during call processing.

![Diagram of IN processing](image_url)

**Intelligent Networks Architecture:**
- **Service Switching Point (SSP):** The SSP performs basic call processing and provides trigger and event detection points for IN processing.
- **Service Control Point (SCP)/ Adjunct:** The SCP stores service data and executes service logic for incoming messages.
- **Intelligent Peripheral (IP):** The Intelligent Peripheral (IP) provides specialized functions for call processing, including speech recognition, prompting for user information, and playing custom announcements.
- **Service Management System (SMS):** Most of the IN services require the management of a significant amount of data. The SMS generally consists of databases that can communicate with IN nodes to provide initial data loading and updates.
- **Service Creation Environment (SCE):** The SCE allows service providers and third-party vendors to create IN services.
**Intelligent Networks Conceptual Model (INCM):**

- **Service Plane:** Represents a view of the network strictly from the view of the service. The underlying implementation is not visible.
- **Global Functional Plane:** A view of the common building blocks across the network that comprise service functions and how they interact with Basic Call Processing.
- **Distributed Functional Plane:** A view of the Functional Entities (FE) that compose the IN network structure. The DFP is where the collection of SIB implementations represent real actions in the course of processing actual service functions. The formal term used to describe these functions is Functional Entity Actions (FEA). For example, this plane describes BCSM within the CCF.
- **Physical Plane:** Represents the physical view of the equipment and protocols that implement the FE that are described in the DFP.
- **SSP**
  - **Call Control Function (CCF):** Provides call processing and switch-based feature control. This includes the setup, maintenance, and takedown of calls in the switching matrix and the local features that are associated with those calls.
  - **Call Control Agent Function (CCAF):** Provides users with access to the network.
  - **Service Switching Function (SSF):** Provides cross-functional processing between the CCF and SCF, such as the detection of trigger points for IN processing.
- **SCP:**
  - **Service Control Function (SCF):** Directs call processing based on Service Logic Programs.
  - **Service Data Function (SDF):** Provides service-related customer and network data for access by the SCF during the execution of service logic.
- **SMS**
  - **Service Management Function (SMF):** Manages the provisioning and deployment of IN services and service-related data.
  - **Service Management Access Function (SMAF):** Provides the interface for accessing the SMF.
- **SCE:**
  - **Service Creation Environment Function (SCEF):** Provides for the creation and validation of new services. Generates the logic used by the SCF.
- **IP:**
  - **Specialized Resource Function (SRF):** Provides resources for end-user interactions, such as recorded announcements and user input via keypads, voice recognition, and so forth.

**Private Virtual Network (PVN):**
- The PVN is a service that uses public network facilities to create a private network.
- An organization with geographically separate locations can share an abbreviated dialing plan using IN to translate the dialed numbers into network-routable addresses. From the user’s perspective, it appears that they are on a private network.
- To determine the call’s routing address, the SSP that serves the originating access queries an SCP using the called number, ANI, and other information. An IN response is returned to the SSP with the new routing address and call processing is resumed.

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