

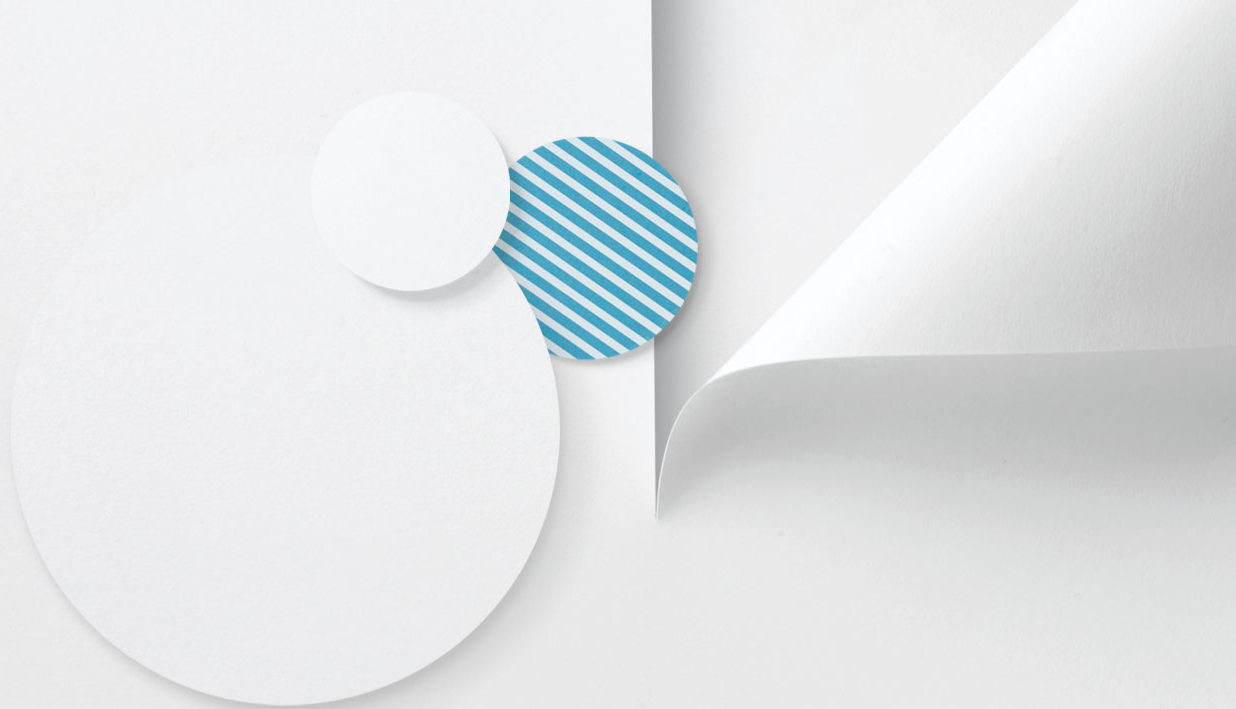
Telephony Framework in Tizen 2.1: What's new?

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TIZEN™
**DEVELOPER
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SAN FRANCISCO

Agenda

- Introduction
- Architecture
- Tizen2.1 Features
- Call Flows
- Porting Telephony
- Future work



Introduction

Introduction | Feature Overview

- **Offers rich functionalities**

- Voice Call and Messaging services
- Supplementary services, USSD
- SIM, Phonebook, SAT
- Packet and A-GPS services
- Network services (LTE, 3G/2G)

- **Plug-in based Architecture**

- Modem Agnostic
- Flexible and easily customizable as per OEM needs

Introduction | Feature Overview

- **Commercial ready**

- Verified on Ref.Device-210 and Ref.Device-PQ
- Verified on Intel Medfield device

- **License**

- Apache License Version 2.0

- **Reference plugin available**

- AT commands (3GPP 27.007/ 27.010) based plugin



Architecture

Architecture | Definitions

- **Core Objects**

- Executable components of a Telephony Module (SIM, CALL, SS, etc.).
- Bundle of functions and supportive database information designated to the Module.

- **Template Core Objects**

- Non-Executable components, but result in executable Core Objects when cloned.

- **Hardware Abstraction Layer (HAL)**

- Abstracts the communication channel with modem.

- **Hooks**

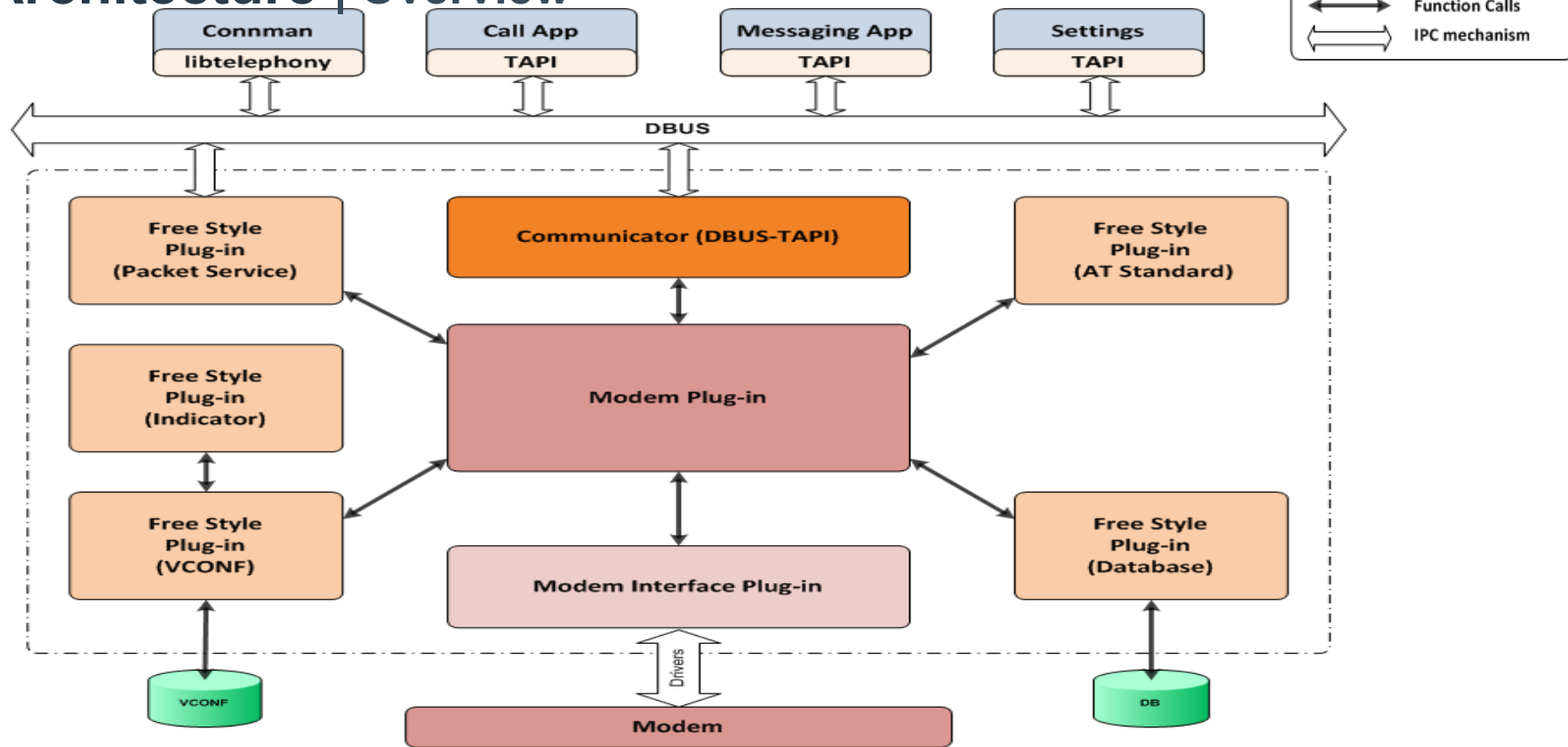
- Mechanism to tap Requests/Notifications of other Telephony Modules of interest.

Architecture | Telephony Components

The major components of Telephony are –

- **Telephony libraries**
 - Telephony API (TAPI) library
 - Core Telephony library
- **Telephony Plug-ins**
 - Communicator plug-ins
 - Modem plug-ins
 - Modem Interface plug-ins (HAL)
 - Free Style plug-ins
- **Telephony Server**

Architecture | Overview

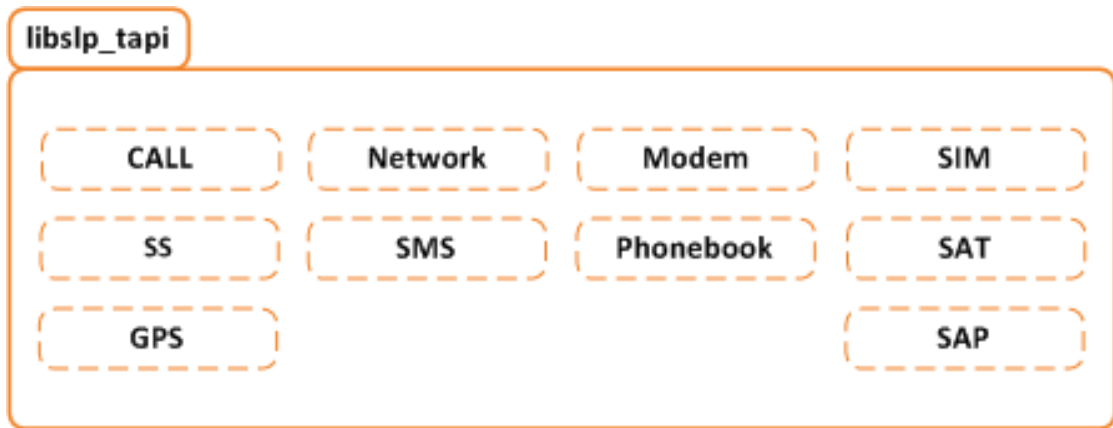


Architecture | TAPI library

Legend



Module API library

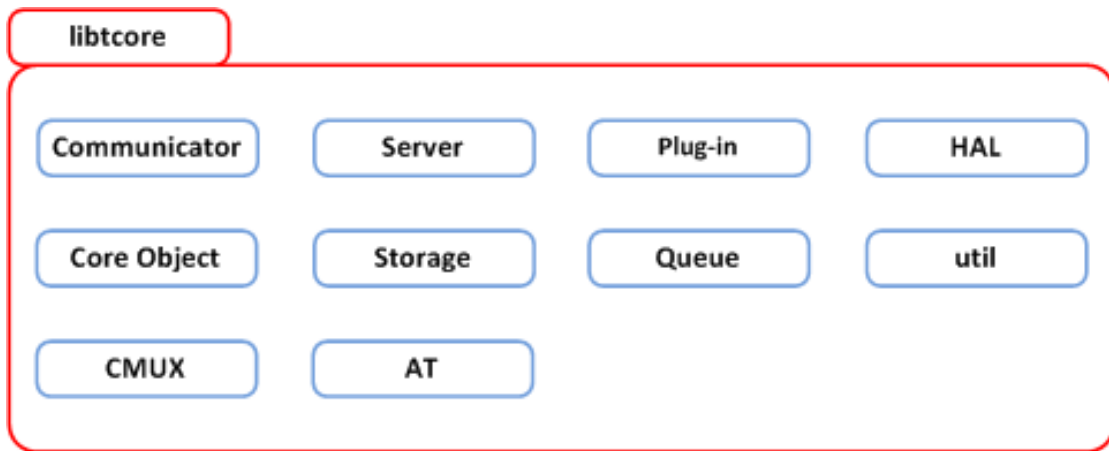


- Telephony API library (or simply *TAPI*) is a standardized interface provided to applications to interact with Telephony over DBUS.
- TAPI is provided as *libslp_tapi* and executes in application's context.
- TAPI provides Sync and Async APIs.

Architecture | Telephony Core library

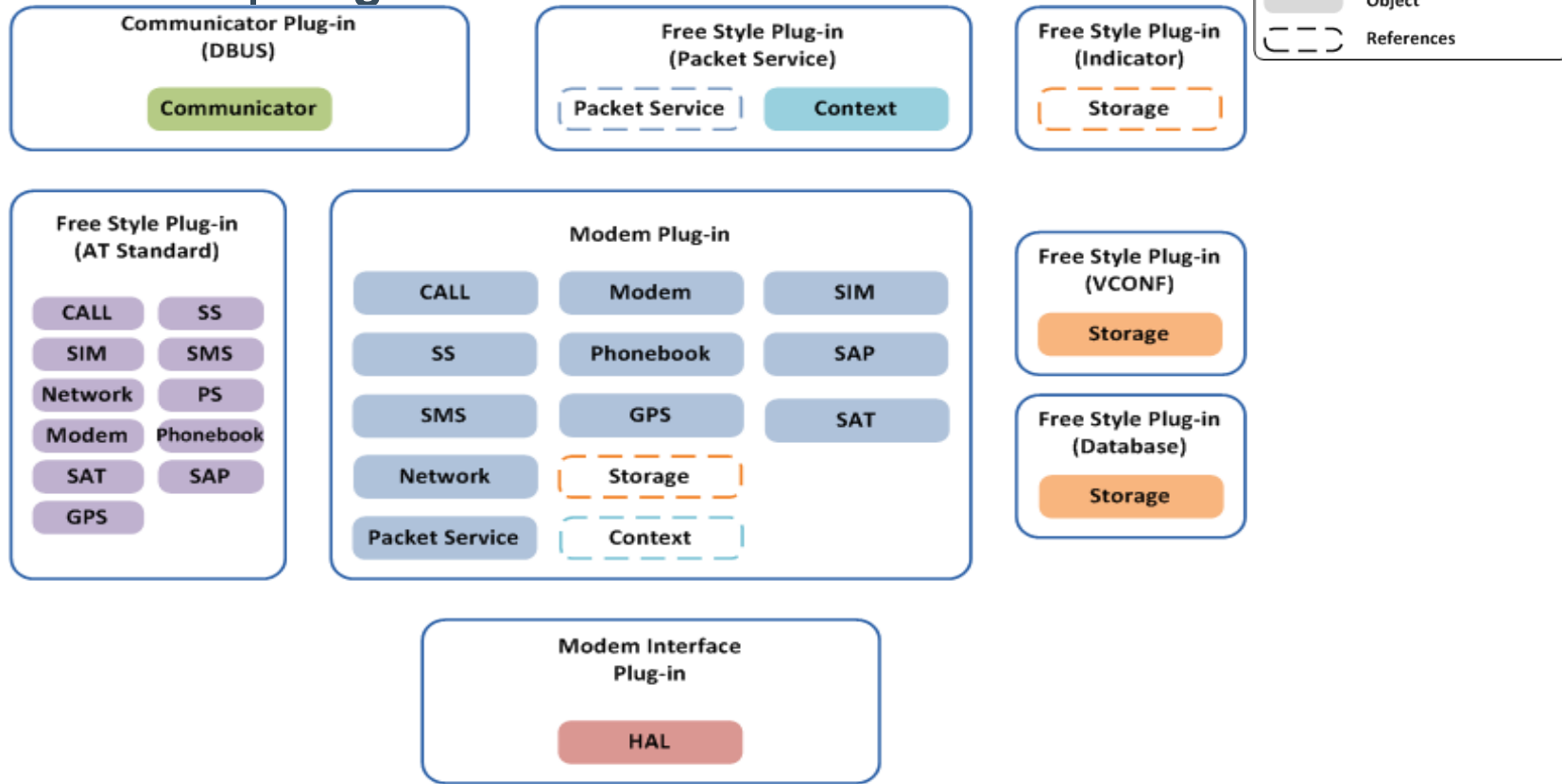
Legend

APIs

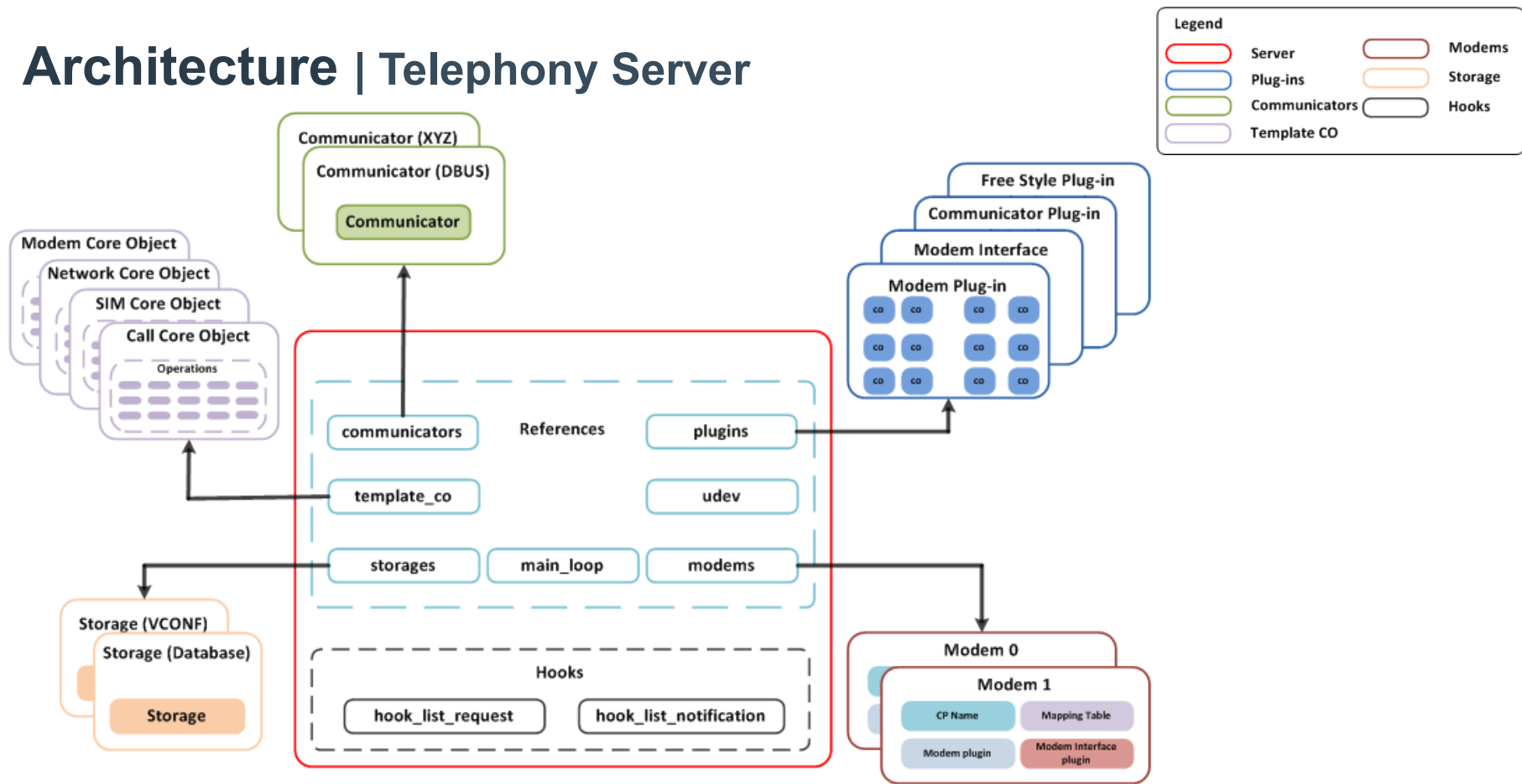


- Core Telephony library (or simply libtcore) provides an API framework for Telephony components to inter-work.
- It is provided as *libtcore* package.

Architecture | Plug-ins



Architecture | Telephony Server

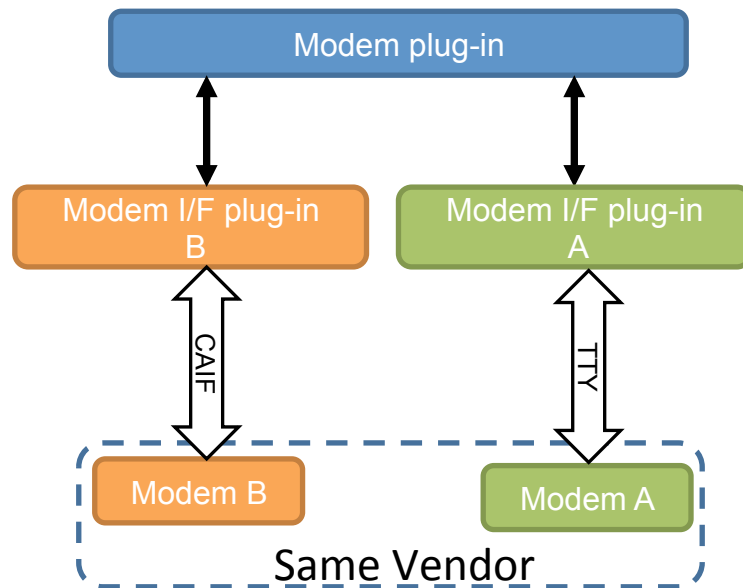




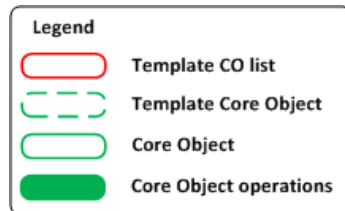
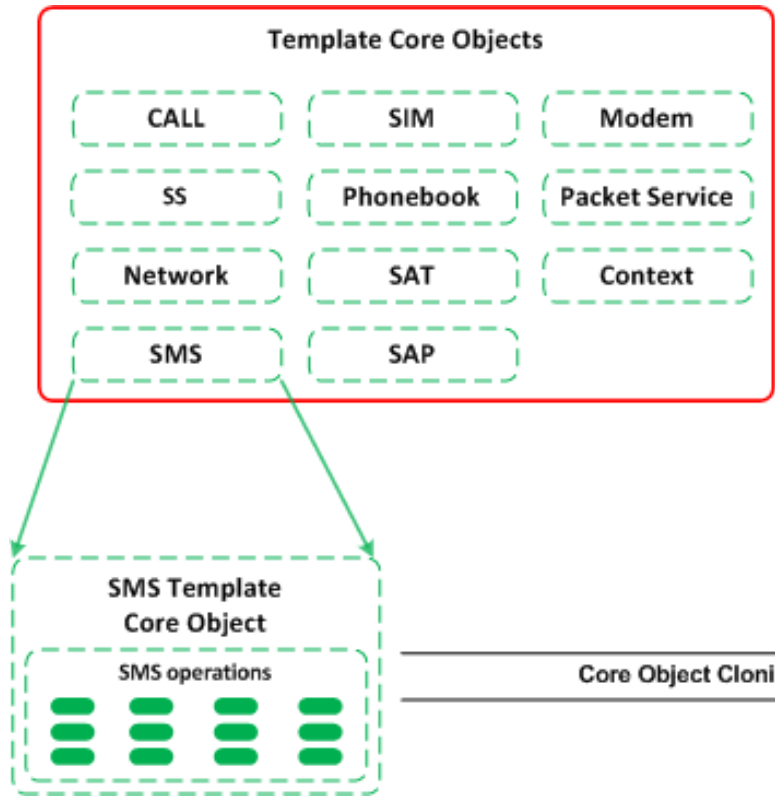
Tizen2.1 Features

Tizen2.1 Features | Design consideration

- Optimize the support of various types of modem architectures from same vendor.
- Modem plug-in needs to be **hardware agnostic**.
- Modem Interface plug-in is the adaptation layer between the telephony framework and the hardware of your target device
- Avoid code duplication by introducing Core object templates and operations over-riding.

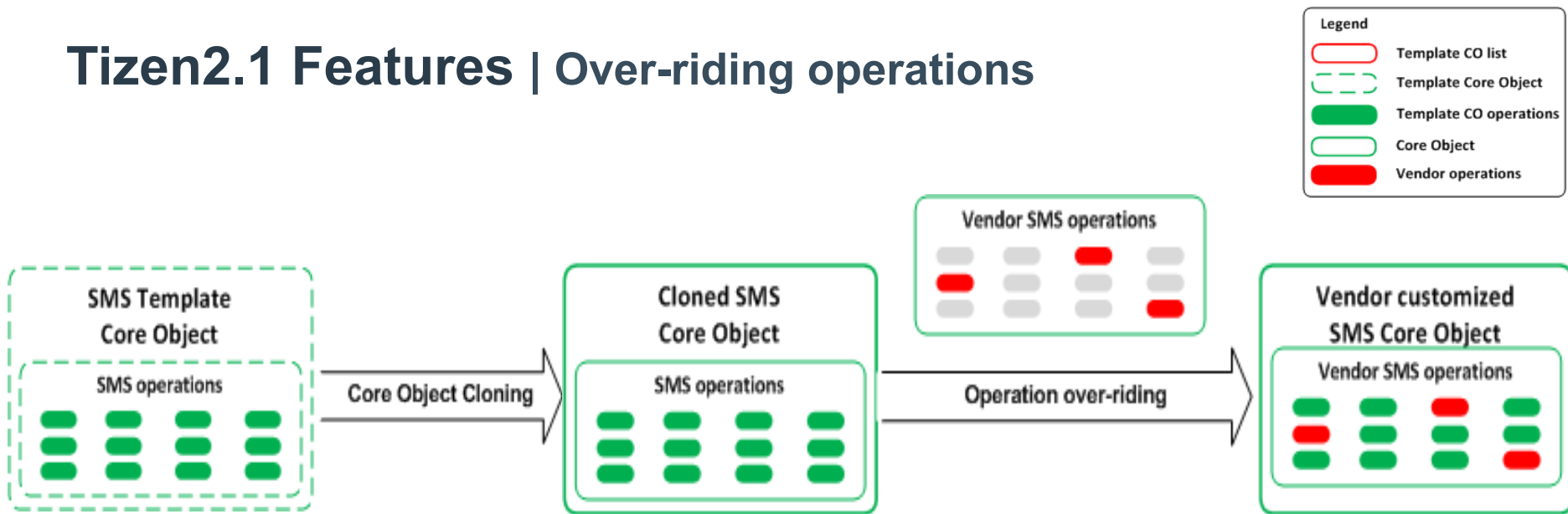


Tizen2.1 Features | Core Object cloning



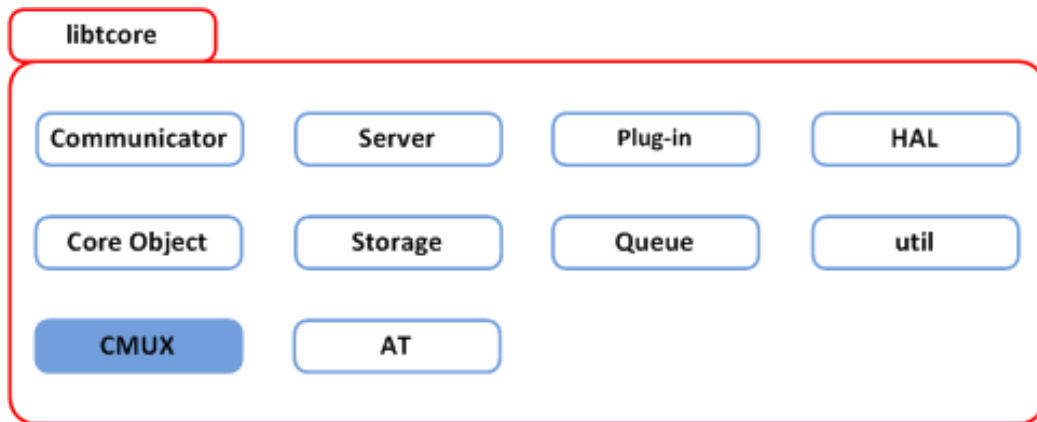
- Core Objects can be cloned from **ready-to-use** Template Core Objects
- Template Core Objects are stored in Server
- Cloned Core object is **Executable**

Tizen2.1 Features | Over-riding operations



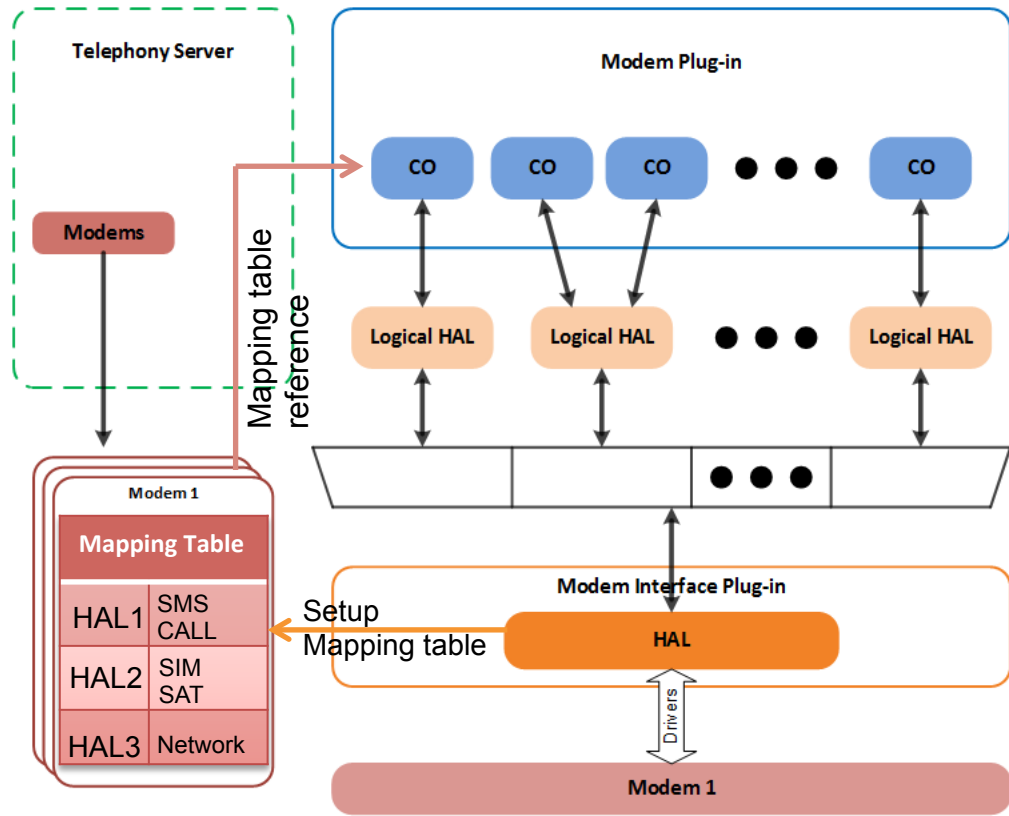
- Operations over-riding enables Vendors to **customize** the Core Objects
- Over-riding can vary from **0 – 100 %**
- Callbacks for notification(s) can also be over-riden

Tizen2.1 Features | CMUX support



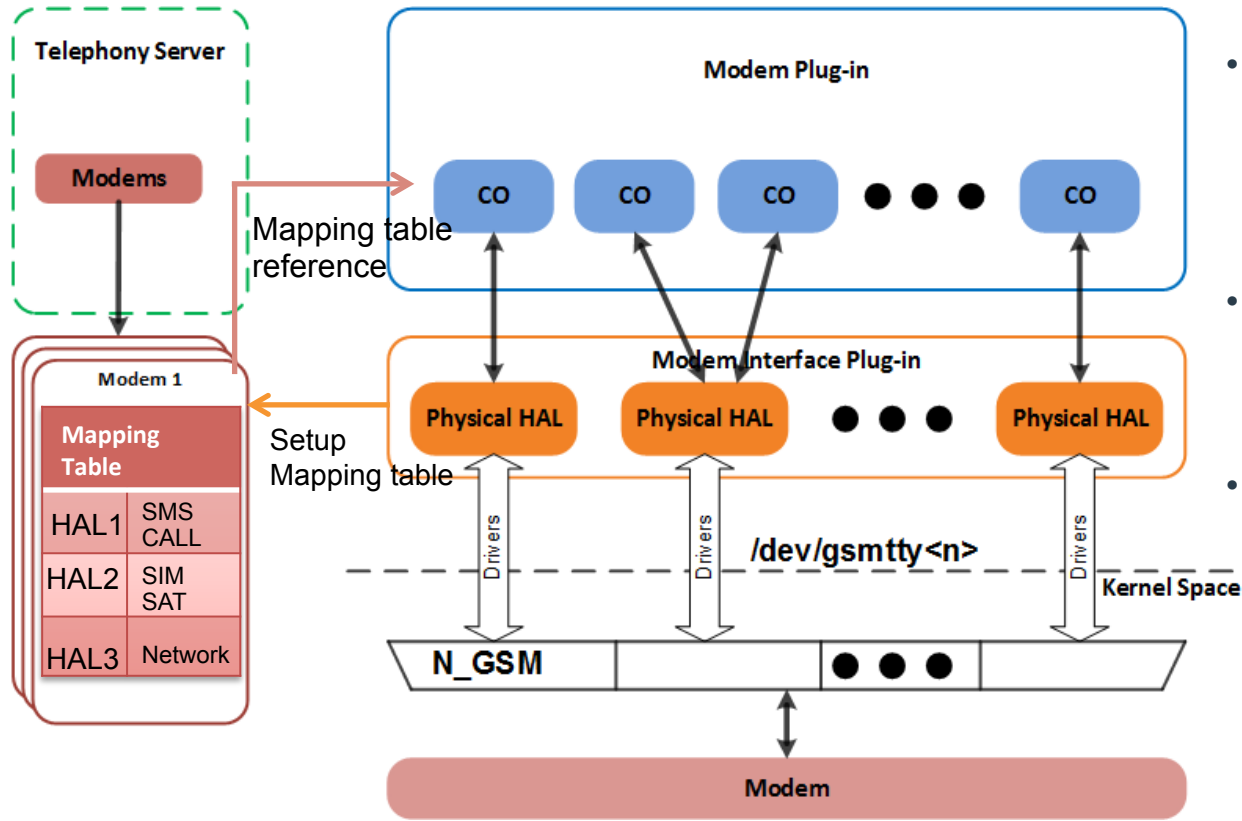
- 3GPP TS 27.010 – Terminal Equipment to Mobile Station (TE-MS) multiplexer protocol is supported
- Currently supports Basic mode operation
- Enables different Core Objects (CALL, SIM, SMS, etc) to interact with Modem **concurrently** through multiple CMUX channels

Tizen2.1 Features | Internal CMUX



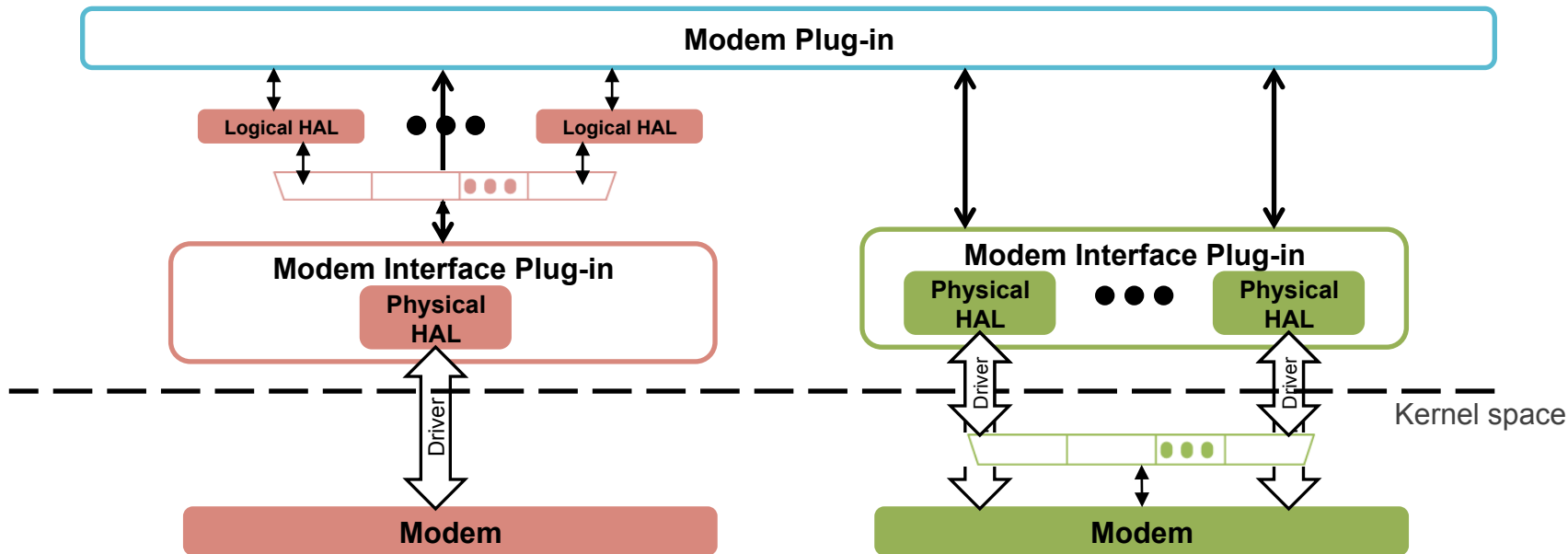
- Internal CMUX uses CMUX feature of *libtcore*
- Each Logical HAL has a dedicated CMUX channel
- Logical HALs can be **shared** between Core Objects
- The HAL assignment to Core Objects is done by the **mapping table**

Tizen2.1 Features | Kernel CMUX



- The MUX driver is an open source implementation (N_GSM) of the 3GPP 27.010
- Multiple Physical HALs exist, each has a dedicated Kernel CMUX channel
- Physical HALs can be **shared** between Core Objects

Tizen2.1 Features | Hardware agnostic Modem plug-in

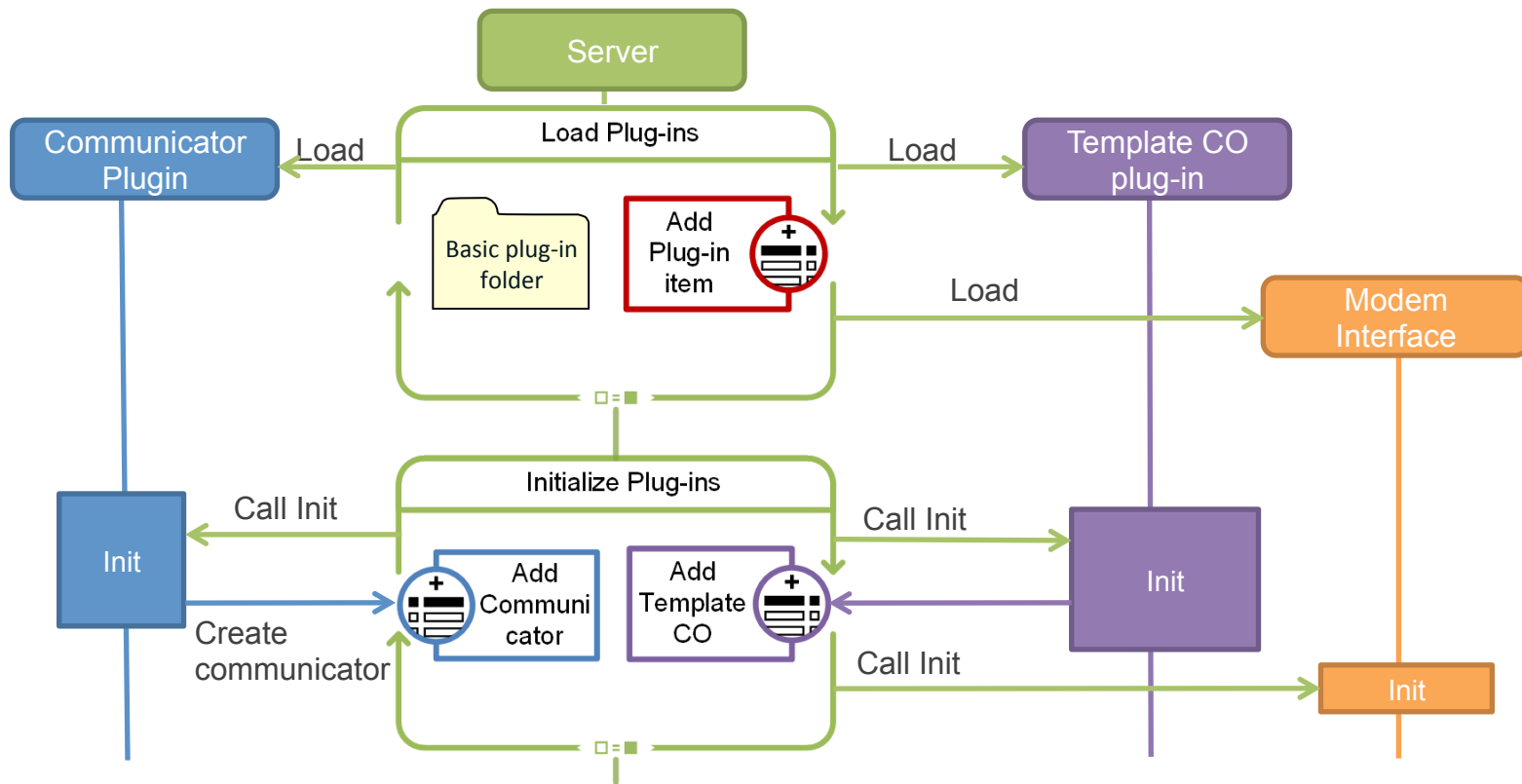


- Same Modem plug-in can operate across various types of modem architectures (from same vendor)
- Hardware specific adaptation are required ONLY in Modem Interface plug-in

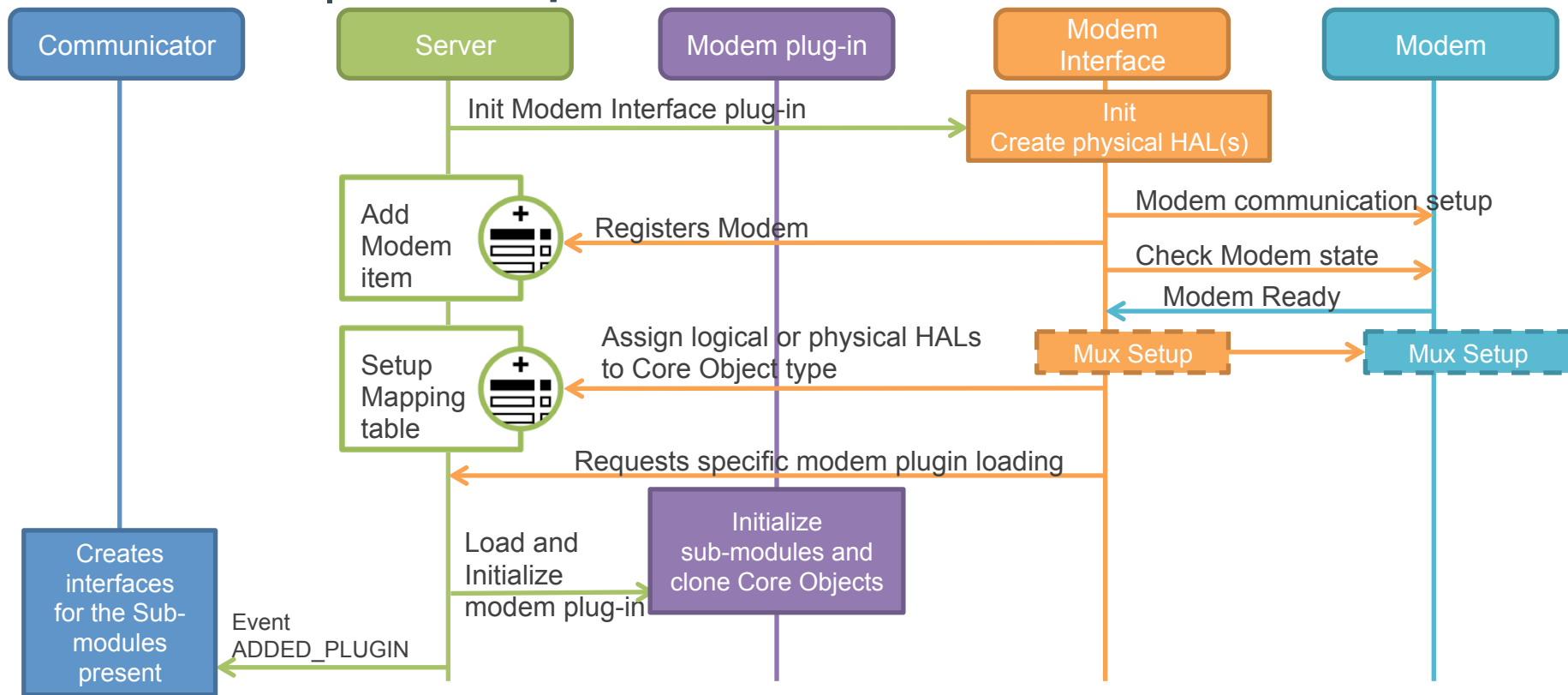


Call Flows

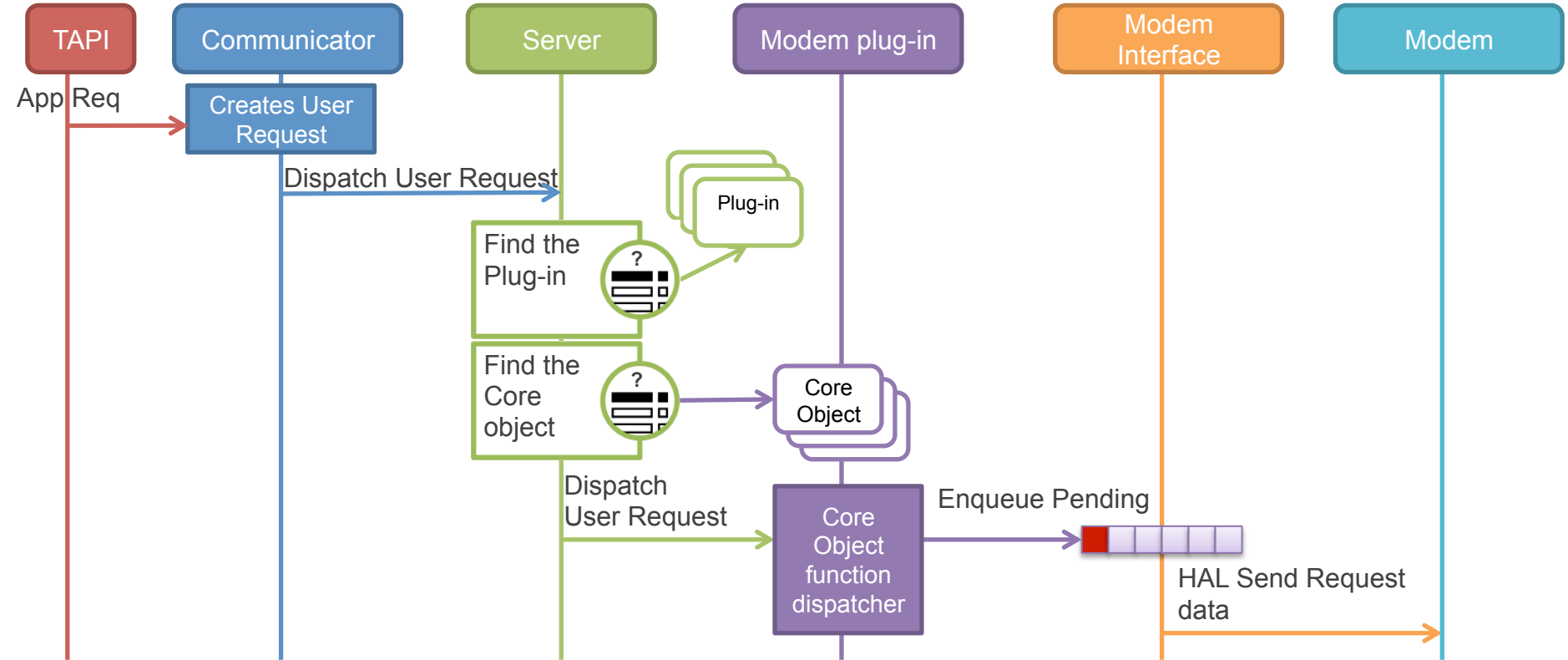
Call Flows | Boot-up sequence



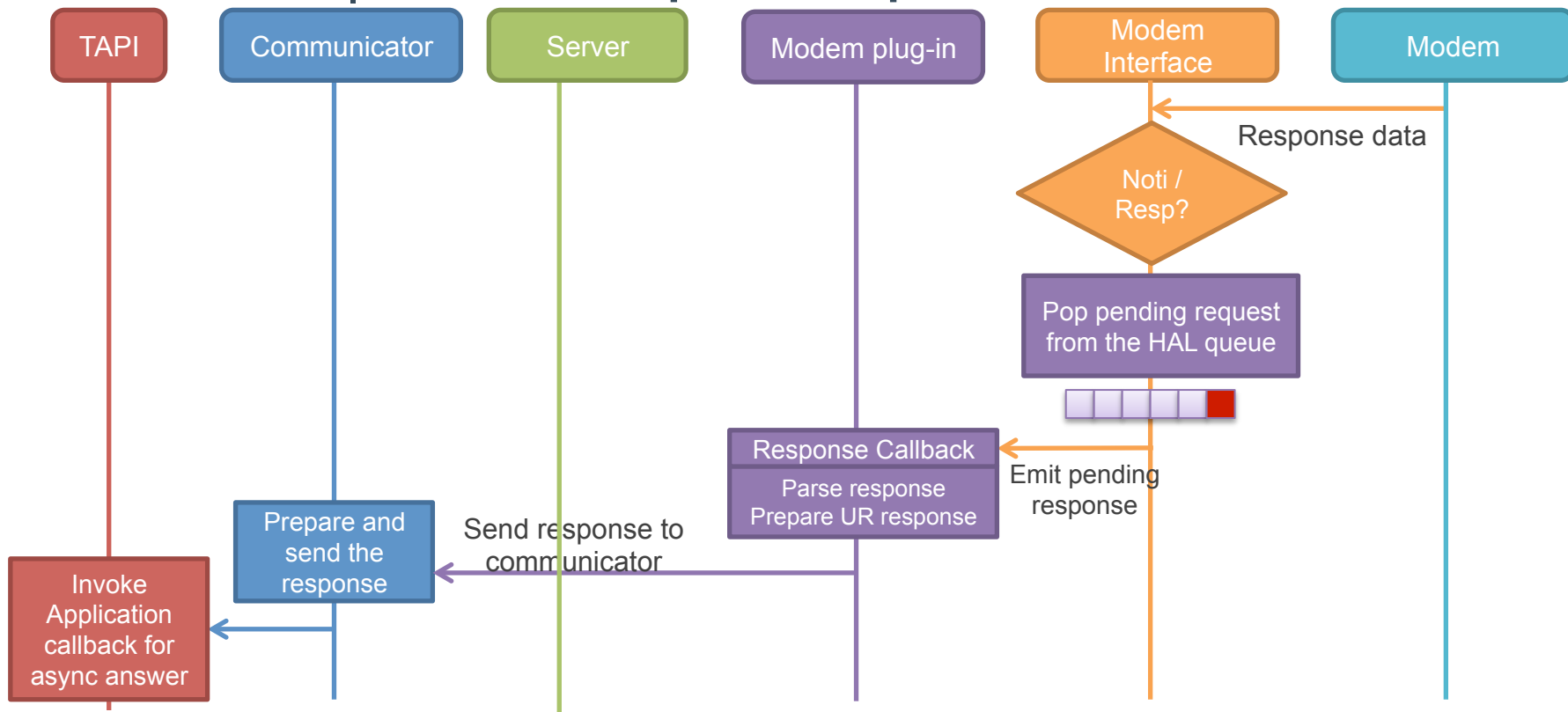
Call Flows | Initial sequence



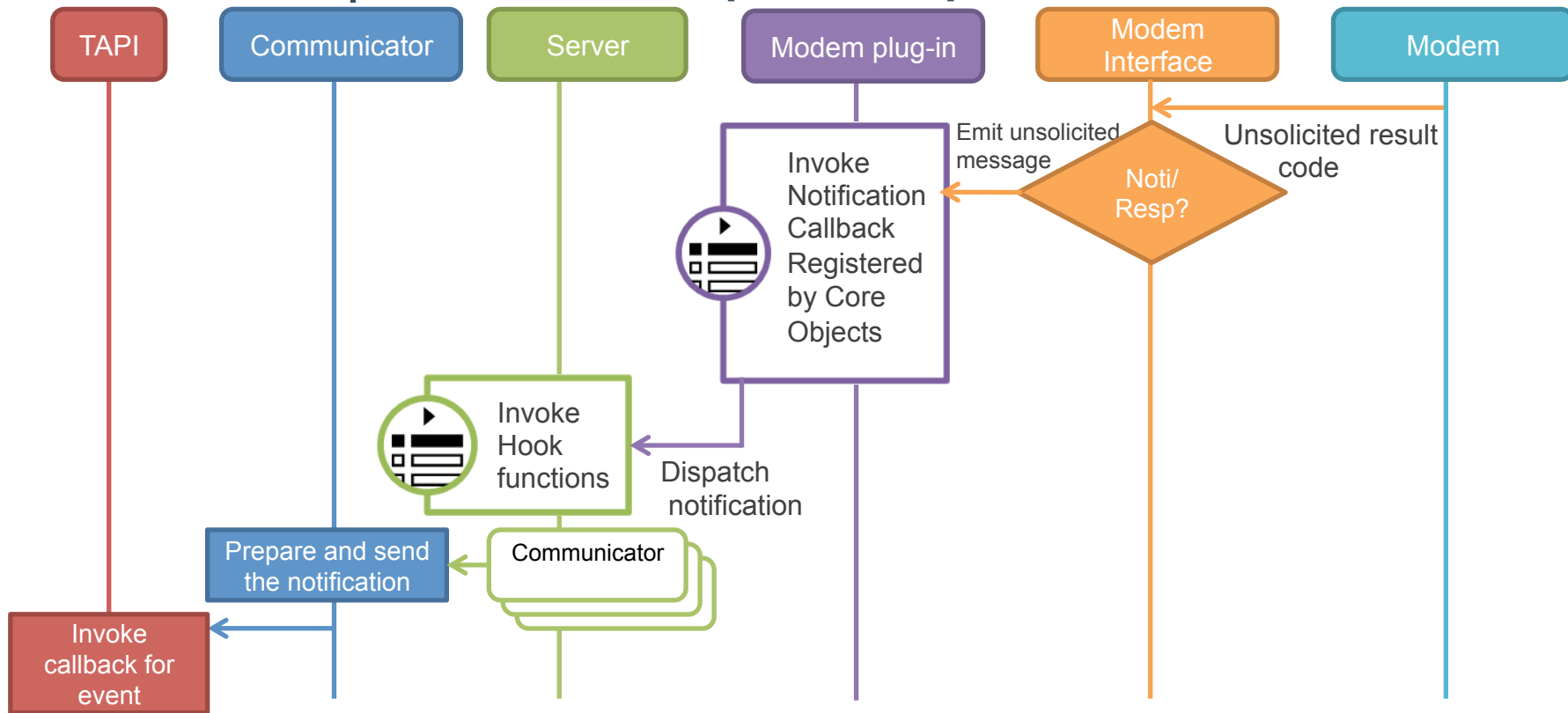
Call Flows | Application request sequence



Call Flows | Solicited Response sequence



Call Flows | Unsolicited Response sequence





Porting Telephony

Porting Telephony | Implementing plug-ins

- All telephony plug-ins mandatorily need to provide a **descriptor structure**

Descriptor Structure	Description of structure elements
<code>struct tcore_plugin_define_desc {</code>	Structure referred by Telephony Server to load, initialize, and unload the Plug-in.
<code>gchar *name;</code>	Name of Plug-in
<code>enum tcore_plugin_priority priority;</code>	Initializing priority of the Plug-in
<code>int version;</code>	Plug-in version
<code>gboolean (*load)();</code>	Plug-in load function reference
<code>gboolean (*init)(TcorePlugin *);</code>	Plug-in init function reference
<code>void (*unload)(TcorePlugin *);</code>	Plug-in unload function reference
<code>};</code>	

- OEM vendors can customize **each and every** Telephony plug-in as per their needs.
- It is **NOT** mandatory that all the plug-ins need to be changed to support a specific hardware.

Porting Telephony | Vendor plug-in requisites

• Modem Interface plug-in

- Establish connection to modem, additionally if required setup CMUX (either internal or Kernel)
- Create HALs (Logical and/or Physical)
- Register new modem into server
- Assign Core Object types to HALs (logical or physical) and update Mapping Table with the corresponding assignments
- Request Server to load modem specific Modem plug-in

• Modem plug-in

- Clone and initialize the Core Objects according the Mapping Table
- Override the operations and callbacks (if required)
- Start Telephony functionalities



Future work

Future work

- USB data dongle support
- VoLTE support
- CDMA modem support
- Multi-SIM



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