AUTOSAR Partial Network Concept

KPIT

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Agenda

- ❑ Energy Management Introduction
- ❑ Partial Networking
- ❑ Partial Networking - Restrictions

Energy Management Introduction

The goal of efficient energy management in AUTOSAR is to provide mechanisms for power saving, especially while **bus communication is active** (e.g. charging or clamp 15 active).
AUTOSAR R3.2 and R4.0.3 support only Partial Networking.

Partial Networking

- Allows for turning off network communication across multiple ECUs in case their provided **functions** are not required under certain conditions. Other ECUs can continue to communicate on the same bus channel.
- Uses NM messages to communicate the request/release information of a partial network cluster between the participating ECUs

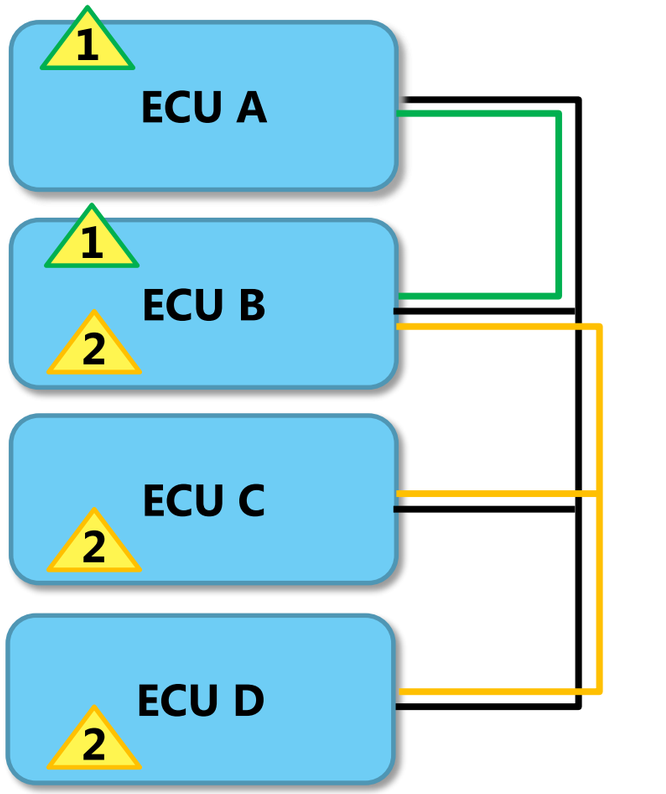
Energy Management Introduction

Partial Network Cluster (PNC)

PNC is a group of system signals necessary to support one or more vehicle functions that are distributed across multiple ECUs in the vehicle network. This represents the system view of mapping a group of buses to one ore more VFCs.

Energy Management – Partial Networking

Example scenario of a partial network going to sleep



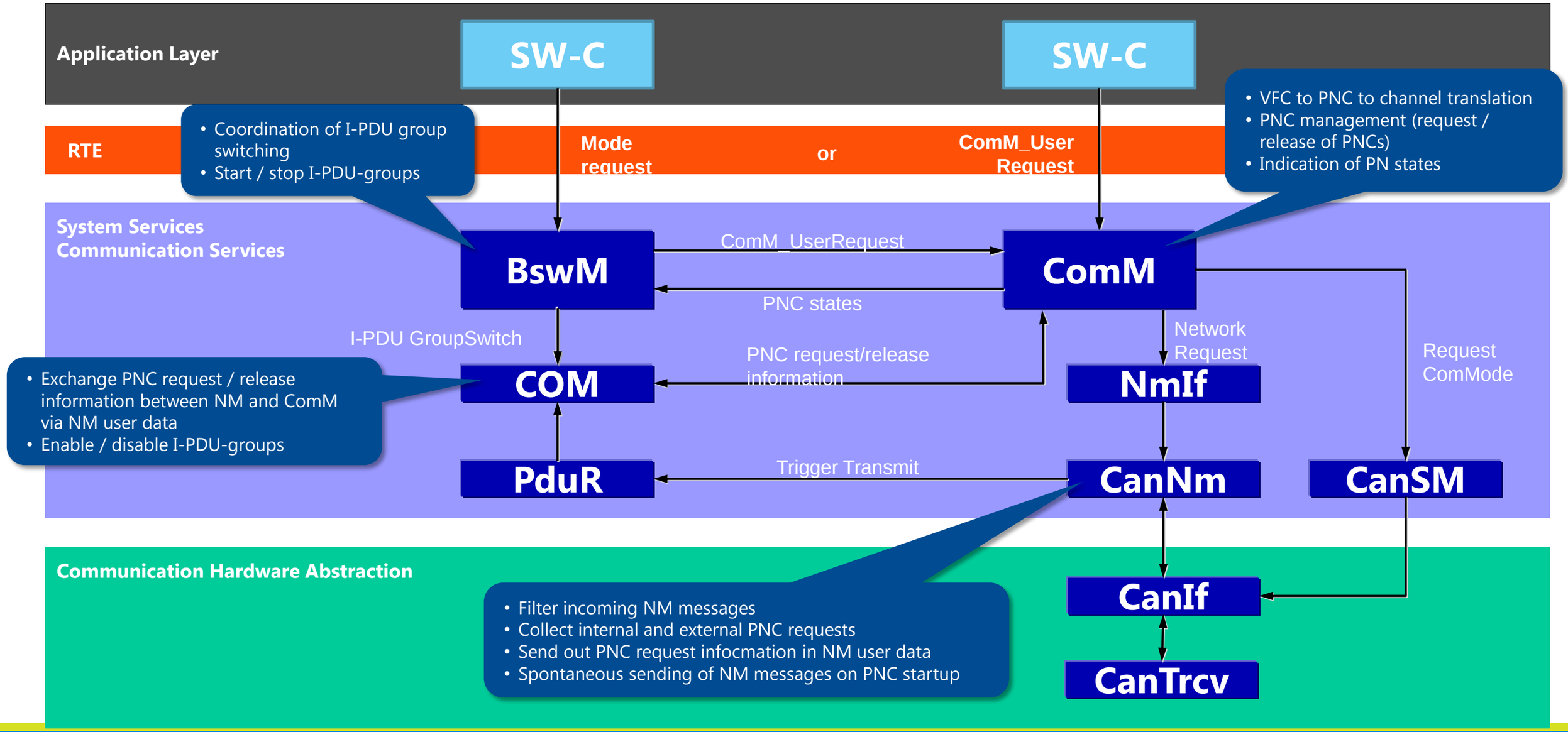
Initial situation:

- ECUs “A” and “B” are members of Partial Network Cluster (PNC) 1. ECUs “B”, “C” and “D” are members of PNC 2.
- All functions of the ECUs are organized either in PNC 1 or PNC 2.
- Both PNCs are active.
- PNC 2 is only requested by ECU “C”.
- The function requiring PNC 2 on ECU “C” is terminated, therefore ECU “C” can release PNC 2.

This is what happens:

- ECU “C” stops requesting PNC 2 to be active.
- ECUs “C” and “D” are no longer participating in any PNC and can be shutdown.
- ECU “B” ceases transmission and reception of all signals associated with PNC 2.
- ECU “B” still participates in PNC 1. That means it remains awake and continues to transmit and receive all signals associated with PNC 1.
- ECU “A” is not affected at all.

Role of Different BSW modules in Partial Networking

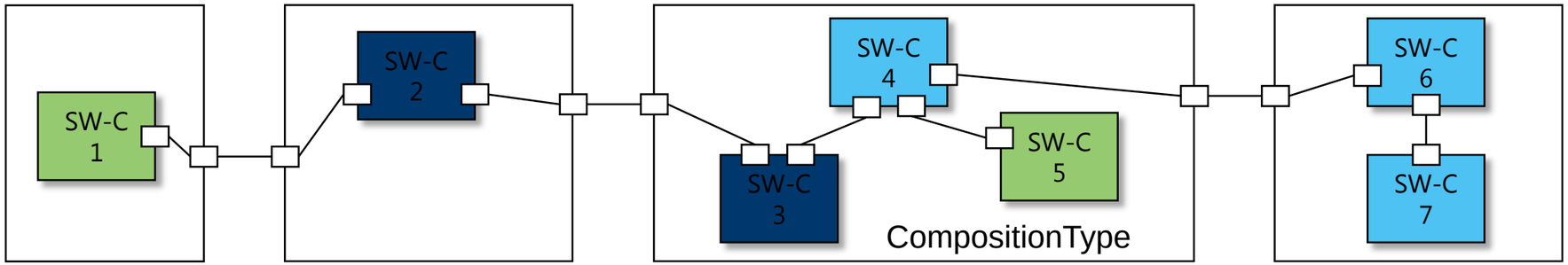


Partial Networking Restrictions

- Partial Networking (PN) is currently supported on CAN and FlexRay buses.
- LIN and CAN slave buses (i.e. CAN buses without network management) can be activated* using PN but no wake-up or communication of PN information are supported on those buses
- To wake-up a PN ECU, a special transceiver HW is required as specified in ISO 11898-5.
  - The standard wake-up without special transceiver HW known from previous AUTOSAR releases is still supported.
- A VFC can be mapped to any number of PNCs (including zero)
  - The concept of PN considers a VFC with only ECU-internal communication by mapping it to the internal channel type in ComM as there is no bus communication and no physical PNC
- Restrictions for CAN
  - J1939 and PN exclude each other, due to address claiming and J1939 start-up behavior
  - J1939 need to register first their address in the network before they are allowed to start communication after a wake-up.
  - A J1939 bus not using address claiming can however be activated using PN as a CAN slave bus as described above
- Restrictions on FlexRay
  - FlexRay is only supported for requesting and releasing PNCs.
  - FlexRay nodes cannot be shut down since there is no HW available which supports PN.

Partial Networking

Mapping of Virtual Function Cluster to Partial Network Cluster



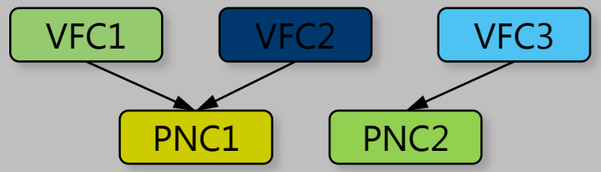
SW-Component of VFC1

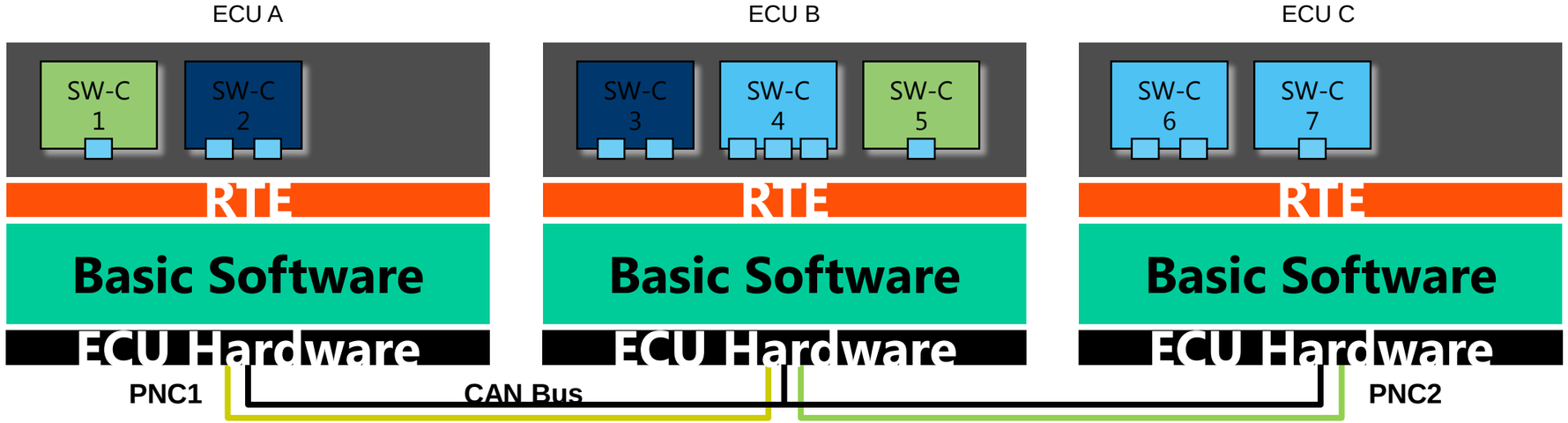
SW-Component of VFC2

SW-Component of VFC3

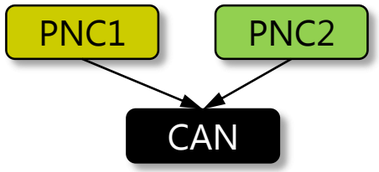
Communication Port

Mapping of VFC on PNC





- Here both Partial Networks map to one CAN bus.
- One Partial Network can also span more than one bus.



Questions

Thank You

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