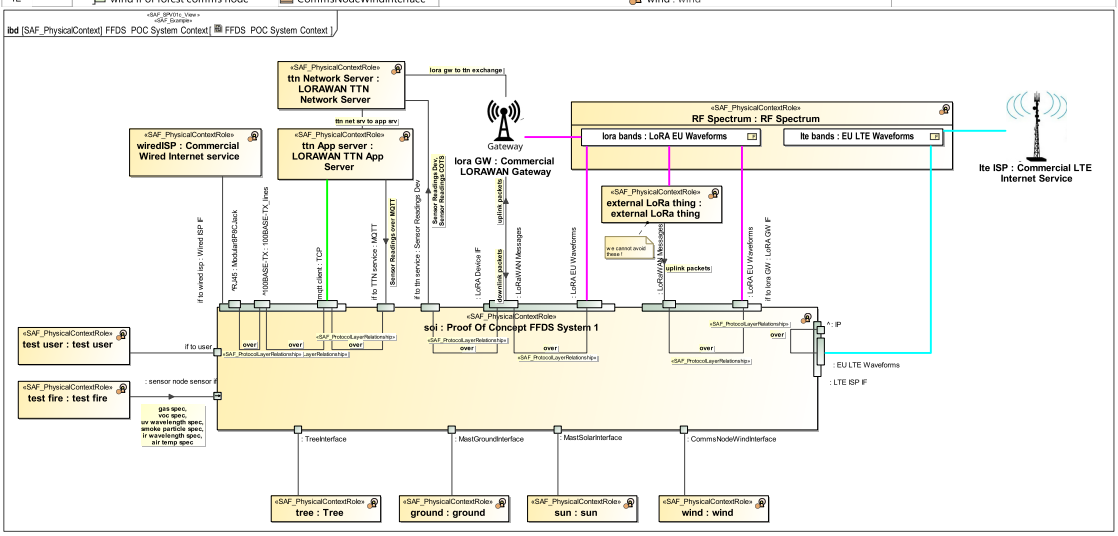
SAF User Documentation : Physical Context Exchange Viewpoint

Domain	Aspect	Maturity
Physical	Context & Exchange	released

Example

#	Port Name	Port Type	Type Features	Connects to	Documentation
1	if to ext GW	LoRA Device IF	p1 : LoRA EU Waveforms p2 : LoRaWAN Messages	: LoRA EU Waveforms lora GW : Commercial LORAWAN Gateway	
2	if to lora GW	LoRA GW IF	p1 : LoRA EU Waveforms p2 : LoRaWAN Messages	: LoRA EU Waveforms external LoRa thing : external LoRa thing	
3	if to LTE ISP	LTE ISP IF	IP : IP p1 : EU LTE Waveforms		
4	if to TTN service	MQTT		ttn App server : LORAWAN TTN App Server	
5	if to ttn service	Sensor Readings Dev	uv : uv values voc : voc values	ttn Network Server : LORAWAN TTN Network Server	
6	if to user			test user : test user	
7	if to wired isp	Wired ISP IF	100BASE-TX : 100BASE-TX_lines mqtt client : TCP RJ45 : Modular8P8CJack	ttn App server : LORAWAN TTN App Server wiredISP : Commercial Wired Internet service	
8	if to test fire	sensor node sensor if	in gas : gas spec in smoke : smoke particle spec in temp air : air temp spec in temp ir : ir wavelength spec in uv : uv wavelength spec in voc : voc spec	test fire : test fire	
9	mount if of forest comms node	MastGroundInterface	electrical mechanical	ground : ground	
10	mount if of forest sensor node	TreeInterface		tree : Tree	
11	solar if of forest comms node	MastSolarInterface		sun : sun	
12	wind if of forest comms node	CommsNodeWindInterface		wind : wind	



Purpose

The Physical Context Exchange Viewpoint focuses on the identification of the physical interfaces with external entities and the identification of relevant documentation. It is used to capture Interface Design Requirements, applicable standards, protocols and format specifications, that are agreed upon the interfaces.

Applicability

The Physical Context Exchange Viewpoint is applied early in the life cycle to generate a complete view of all the relevant external interfaces together with relevant standards. The viewpoint guides the identification of expected interactions of the system with entities external to its system (control) boundary as defined in negotiated ICDs. The viewpoint is used to capture the Interface Design Requirements with the relevant stakeholders and any relevant documentation, requirements, standards, format specifications and protocols.

The Physical Internal Exchange Viewpoint supports the "Create System Design " activity included in "Design Definition Process" activities of the INCOSE SYSTEMS ENGINEERING HANDBOOK 2023 [§ 2.3.5.5] and contributes to the System Interface definition.

It also supports the "Interface Management" method of the INCOSE SYSTEMS ENGINEERING HANDBOOK 2023 [§ 3.2.4].

Presentation

A) For each identified context an IBD is used to identify the physical interfaces, the item flows that are exchanged on that interfaces and related documentation. Mapping of protocol layere is shown as appropriate to understand the interfaces.

B) A table providing a list of all the defined external interfaces and the applicable documentation

- context element kind (environment / external entity / physical user)
- context element role name
- port name and reference to port type
- reference to context element type

C) A table listing the applicable standards, protocols and formats for the item flows exchanged via the identified interfaces.

Stakeholder

- Acquirer
- Customer
- Hardware Developer
- IV&V Engineer
- Maintainer
- Safety Expert
- Security Expert
- Software Developer
- Supplier
- System Architect

Concern

- How to connect the system or a system element to a test equipment?
- How will the system be used by whom and which contextual elements are involved?
- What are the Interface Requirements regarding bandwidth, data throughput and latency?
- What are the external physical entities the system interacts with in the respective context?
- What are the protocols for exchanging items on specific interface?
- What kind of physical items (energy, material, information, etc.) are exchanged between the system and external entities?
- Which interface design items are on an interface of a physical architecture element?
- Which interface partners does a physical system element have?
- Which standards, protocols and format specifications are associated with a specific interface?

Profile Model Reference

The following Stereotypes / Model Elements are used in the Viewpoint:

- Attribute "realizing connector" of ItemFlow referencing Connector
- Connector [UML_Standard_Profile]
- FlowProperty [SysML Profile]
- FlowProperty contained in SAF_PhysicalInterfaceDefinition
- FlowProperty typed by SAF_PhysicalExchangeType
- ItemFlow [SysML Profile]
- ItemFlow typed by SAF_PhysicalExchangeType
- ProxyPort [SysML Profile]
- ProxyPort typed by SAF_PhysicalInterfaceDefinition
- SAF_PhysicalEnvironment
- SAF_PhysicalExchangeType
- SAF_PhysicalExternalSystem
- SAF_PhysicalInterfaceDefinition
- SAF_PhysicalSystem
- SAF_PhysicalUser
- SAF_ProtocolLayerRelationship
- SAF_SPV01c_View

Input from other Viewpoints

Required Viewpoints

- Physical Context Definition Viewpoint

Recommended Viewpoints

none