

What is potential future work in OmniRAN?

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802.11CF D2.0 (Section 5.9 Deployment scenarios)

- WLAN router
 - Residential network
 - Enterprise network
 - Enterprise network with multiple bridging domains
 - **Industrial network**
 - Public hotspot
 - Virtualized WLAN access network for in-building
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Industrial network

- **Factory (FFIoT)**
 - Reference Model (Discussion in OmniRAN?)
 - Data Attribute (Discussion in TSN and OmniRAN?)
 - Problems and Actual Solution (Discussion in TSN?)
 - Hospital, Airport (IEEE802.11ax, IEEE802.11-14/0214r2)
 - To improve efficiency in the use of spectrum resources in dense networks with large no. of STAs and large no. of Aps
 - To improve efficiency and robustness in outdoor deployments
 - To improve power efficiency
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Five Criteria of Traffic Pattern in factories

Traffic Load-related

QoS Related

Traffic Mode		Frequency		Simultaneous generation		Time sensitivity		Loss sensitivity
Bit	×	Continue	×	Single	×	Sensitive	×	Sensitive
Bulk		High		Multiple		↕		↕
Stream		Low		Insensitive		Insensitive		

3 Modes

FFIoT Use Case

Factory Special

TSN and OmniRAN

3 Typical Traffic Modes

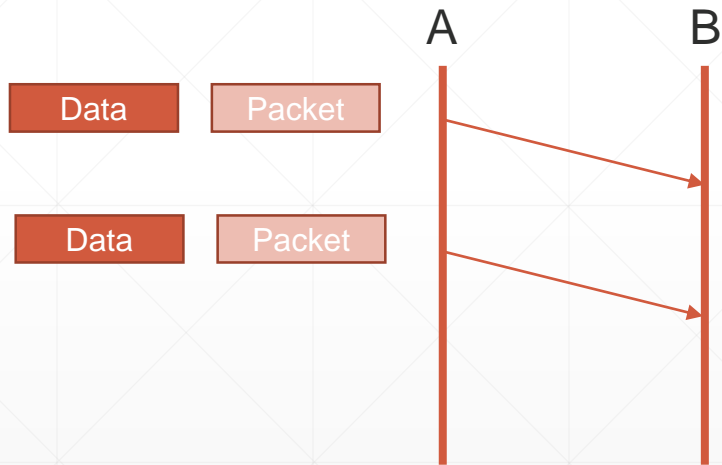
High: over average
Low: under average

Many Machines are Synchronized at Factory Sites

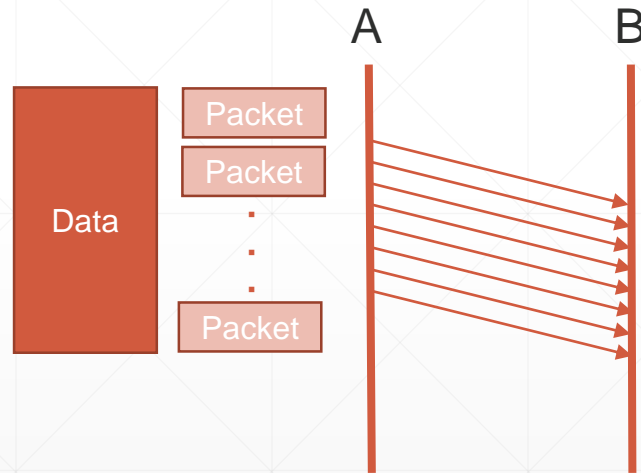
Levels of Time and Loss Sensitivity are same in Many Cases, but sometimes different in factory sites.

3 Traffic Modes

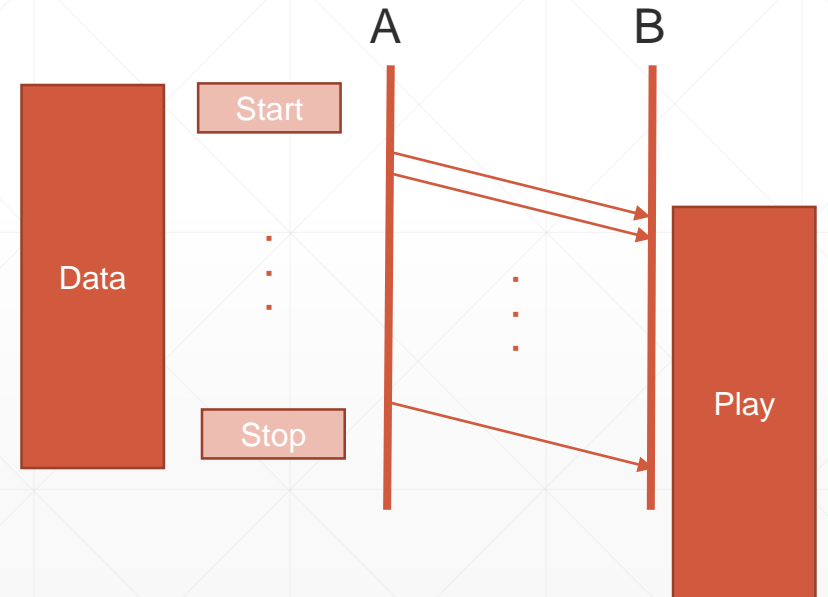
Bit :Under MTU



Bulk: Over MTU



Stream: Multi Media



Frequency (From FFIoT Use Case)

- Continue: over 30data/sec (Stream)
 - High: Higher than 5 data/sec (Over average)
 - Low: from 0 to under 5data/sec (Under average)
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Relationship of IEC/IEEE60802

IEC/IEEE60802	Traffic Mode	Simultaneous Generation	Frequency	Time Sensitivity	Loss Sensitivity
Isosynchronous cyclic real-time	Bit	Single/Multiple	High	Sensitive	Sensitive
Cyclic real-time	Bit	Single/Multiple	High	Sensitive	Sensitive
Network Control	Bit	Single/Multiple	High	Sensitive	Sensitive/Insensitive
Audio/Video	Stream	Single	Continue	Sensitive	Sensitive/Insensitive
Brownfield	Bulk	Single	Low	Sensitive/Insensitive	Sensitive/Insensitive
Alarms/Event	Bit	Single/Multiple	Low	Sensitive	Sensitive
Configuration/Diagnostics	Bulk	Single	Low	Sensitive/Insensitive	Sensitive
Internal/Path-Through	Bulk	Single	Low	Insensitive	Sensitive/Insensitive

Traffic Models (example)

- Traffic types of P60802 are not appropriate to characterize factory applications. All other applications in FFloT[1] are shown in ANNEX.

No.	Wireless application in FFloT		Communication requirements				Five Criteria					Traffic type
	Purpose	Corresponding Information	Transmit Data Size (bytes)	Communication Rate	Delivery Time Tolerance	Node density(*)	Traffic mode	Frequency	Simultaneous generation	Time sensitivity	Loss sensitivity	P60802
22	Checking completion of process	Torque waveform	100K	1 per sec.	1 sec.	14	Bulk	Low	Single	Insensitive	Insensitive	Diagnostics
		OK, NG	100	1 per sec.	1 sec.	14	Bit	Low	Single	Insensitive	Sensitive	No category
added	AGV control	Go, signal, positioning	100	once per 1 min.	100 msec.	10	Bit	High	Multiple	Sensitive	Sensitive	No category
38	Relay of images for moving	video	75K	30 per sec.	None	1	Stream	Continue	Single	Sensitive	Sensitive	Internal/Path-Through

[1] Pre-draft FFloT Whitepaper, <https://mentor.ieee.org/802.1/dcn/17/1-18-0025-05-ICne.pdf>

*Area:20 m x 20 m

IIC Traffic Types for Automation^[1]

- Traffic types for automation are also mapped in four criteria.

IIC traffic type	Characteristics (IIC whitepaper [1])							Five criteria					
	Periodicity P: Periodic S Sporadic	Period	Synchronized to network	Data delivery guarantee	Tolerance to interference [2]	Tolerance to loss [3]	Application data size	Critically	Traffic mode	Frequency	Simultaneous generation	Time sensitivity	Loss sensitivity
Isochronous	P	100us-2ms	Yes	Deadline	0	No	fixed: 30 - 100 Byte	High	Isochronous	High	Single	Sensitive	Sensitive
Cyclic	P	2-20ms	No	Latency	Yes	1-4 frames	fixed: 50 - 1000 Byte	High	Control	High	Single/Multiple	Sensitive	Sensitive
Alarms and Events	S	n.a.	No	Latency	n .a.	Yes	Variable: 50 - 1500 Byte	High	Interrupt	Low	Single/Multiple	Sensitive	Sensitive
Configuration & diagnostics	S	n.a.	No	Bandwidth	n .a.	Yes	Variable: 500 - 1500 Byte	Medium	Bulk	Low	Single	Insensitive	Insensitive
Network Control	P	50ms - 1s	No	Bandwidth	Yes	Yes	Variable: 50 - 1500 Byte	High	Control	Low	Single/Multiple	Sensitive	Sensitive
Best Effort	S	n.a.	No	None	n .a.	Yes	Variable: 30 - 1500 Byte	Low	Interrupt	Low	Single/Multiple	Insensitive	Insensitive
Video	S	n.a.	No	Latency	n .a.	Yes	Variable: 100 - 1500 Byte	Low	Isochronous	Continue	Single	Sensitive	Sensitive
Audio/Voice	S	n.a.	No	Latency	n .a.	Yes	Variable: 1000 - 1500 Byte	Low	Isochronous	Continue	Single	Sensitive	Sensitive

[1] https://www.iiconsortium.org/pdf/IIC_TSN_Testbed_Traffic_Whitepaper_20180418.pdf

[2] Tolerant to certain amount of latency variation of the packet transmission (i.e. jitter)

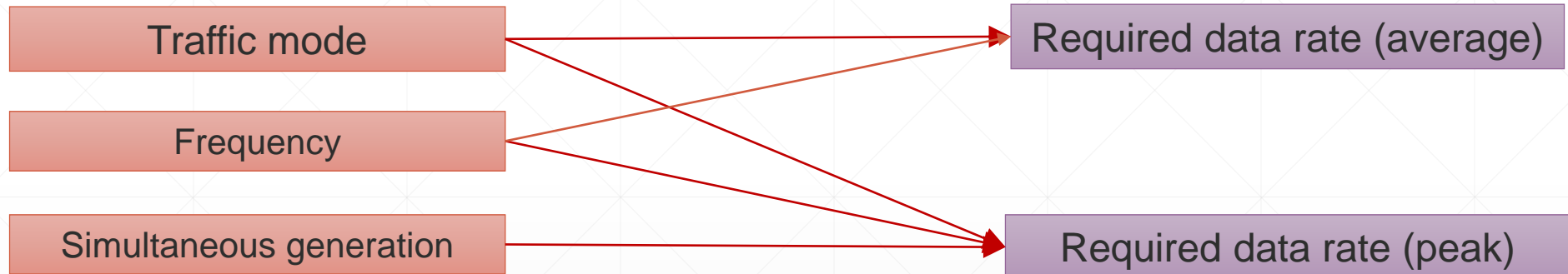
[3] Tolerant to certain amount of consecutive packet loss

Five Criteria to Comprehensive Parameters

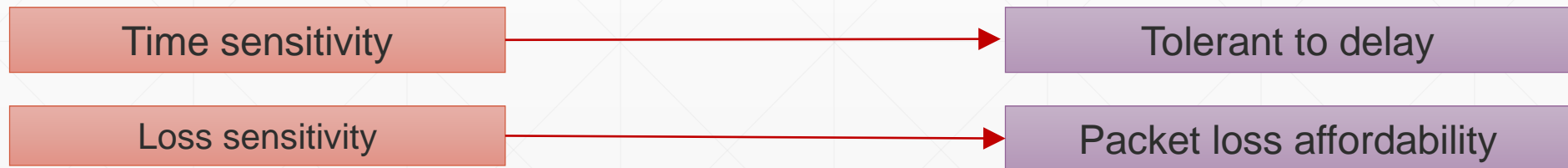
Five Criteria

Comprehensive Parameters for data transmission

Traffic load-related



QoS-related



For Next Step

- **Is it fit to discuss reference model and/or profiling of FFIoT in OmniRAN?**
 - **What we should prepare for next step?**
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