Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [A Study on Radio Resource Measurement and Management]
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Abstract: [This document provides an example case of a wireless network related to radio resource measurement and management for WPANs, where a configuration and interface are shown.]

Purpose: [Informative contribution for SG discussions]

A Study on Radio Resource Measurement and Management

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Summary

Objective:

- Provides an example of system configuration and RRMM related interface for SG discussion on direction of PAR/standardisataion

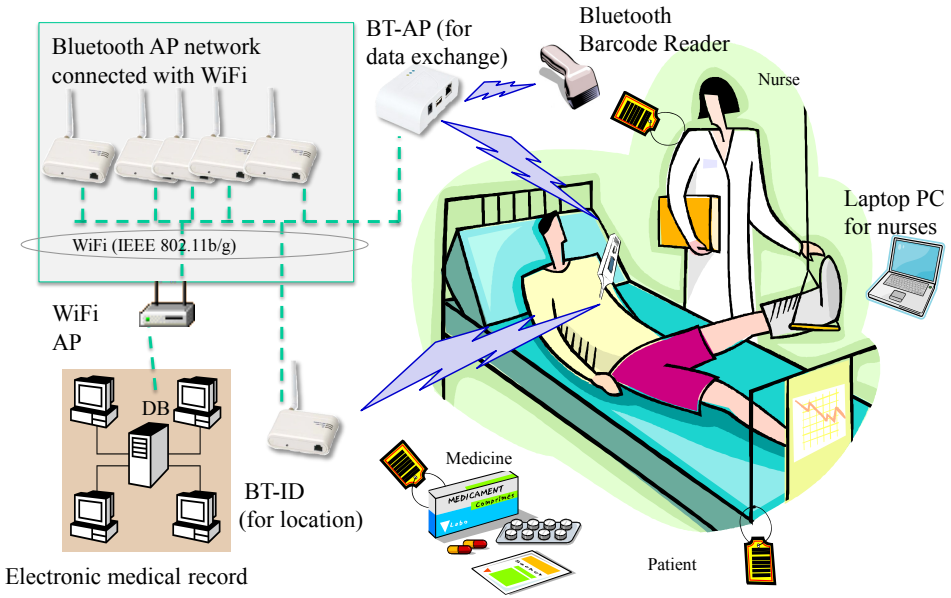
Outline:

- Introduction of dynamic & reconfigurable M2M wireless network
- A configuration
- Interface related to RRMM

Overview of Dynamic & Reconfigurable M2M Wireless Network

Background

- Various M2M applications are in operation using WLAN, Bluetooth, ZigBee, etc in ISM band
  - Medical information systems: medical sensors, handheld devices, …
  - Emergency situations: disaster recovery, rescue operations, …



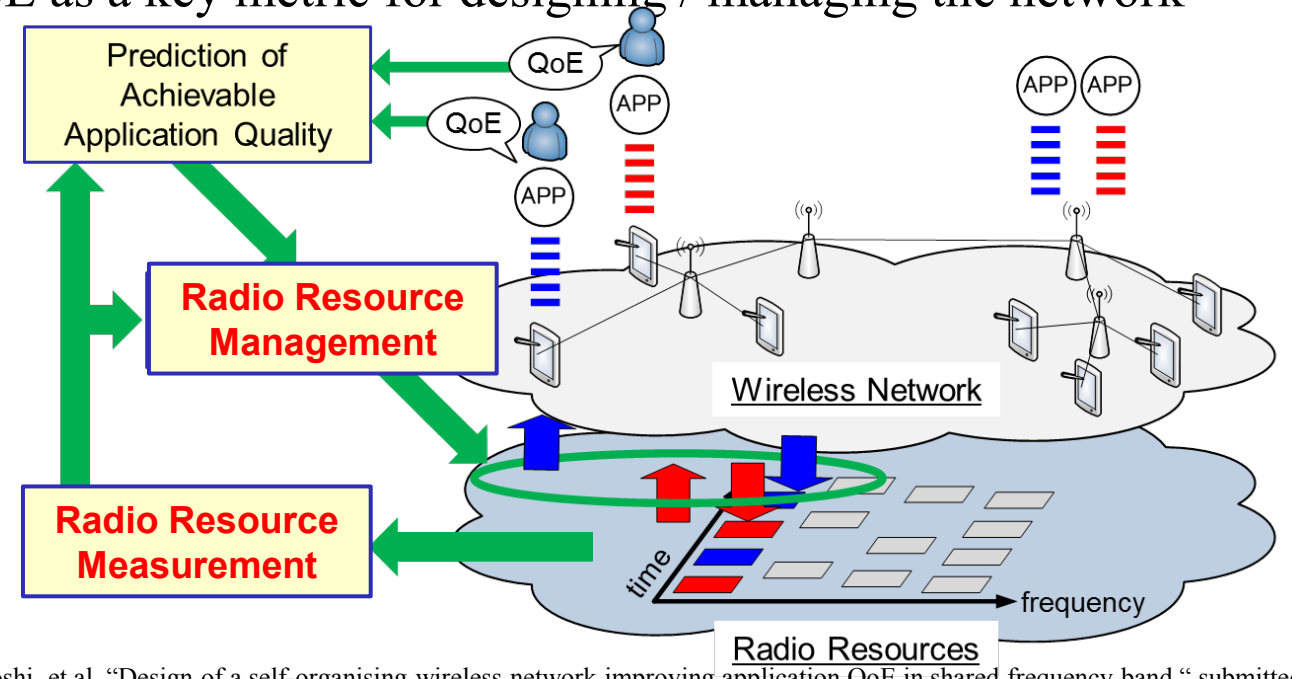
Overview of Dynamic & Reconfigurable M2M Wireless Network (cont'd)

Motivations

- Numerous nodes may generate *a variety of application traffic in different required quality and data size*
  - But, wireless communication resources are limited
  - Emergency systems may be forced to operate in shared band
- Appropriate resources allocations so that *more important applications can run in practical quality*
  - Considering *usage and utility of applications*, *required quality*, *priority*, etc
  - Medical/emergency systems are fatal to humans
- Dynamic reconfiguration of network topology
  - According to movement of nodes and traffic conditions
  - Easy-to-setup for helping non-technical experts quickly build the systems

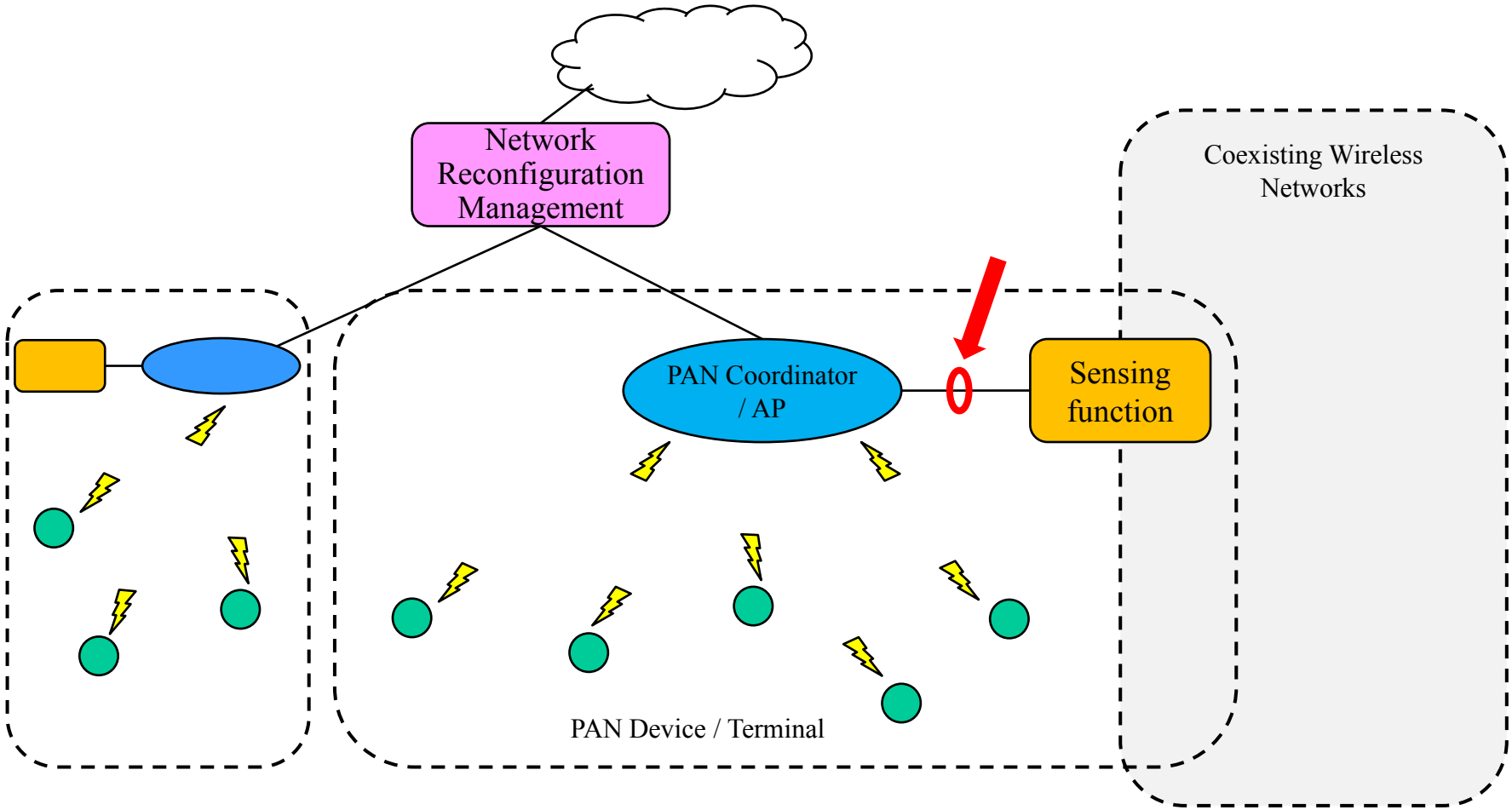
General Concept of the Proposed Dynamic & Reconfigurable M2M Wireless Network

- Self-organising wireless network (autonomous optimisation without human operation)
- Applications on many terminals can run with high quality even in congested shared bands
- QoE as a key metric for designing / managing the network



M Ariyoshi, et al, "Design of a self-organising wireless network improving application QoE in shared frequency band," submitted to SDR-WInnComm 2014

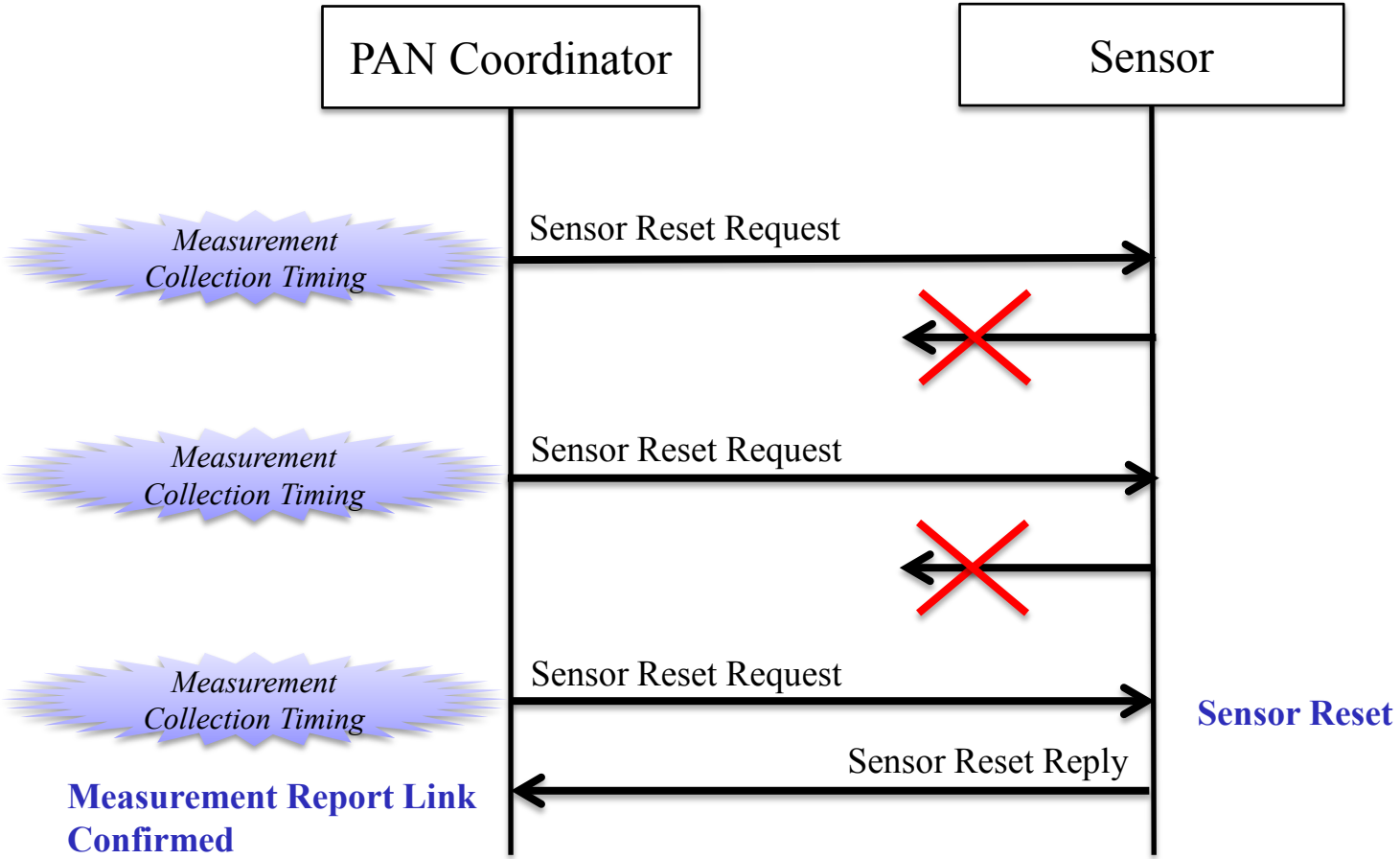
A Configuration of the Dynamic & Reconfigurable M2M Wireless Network



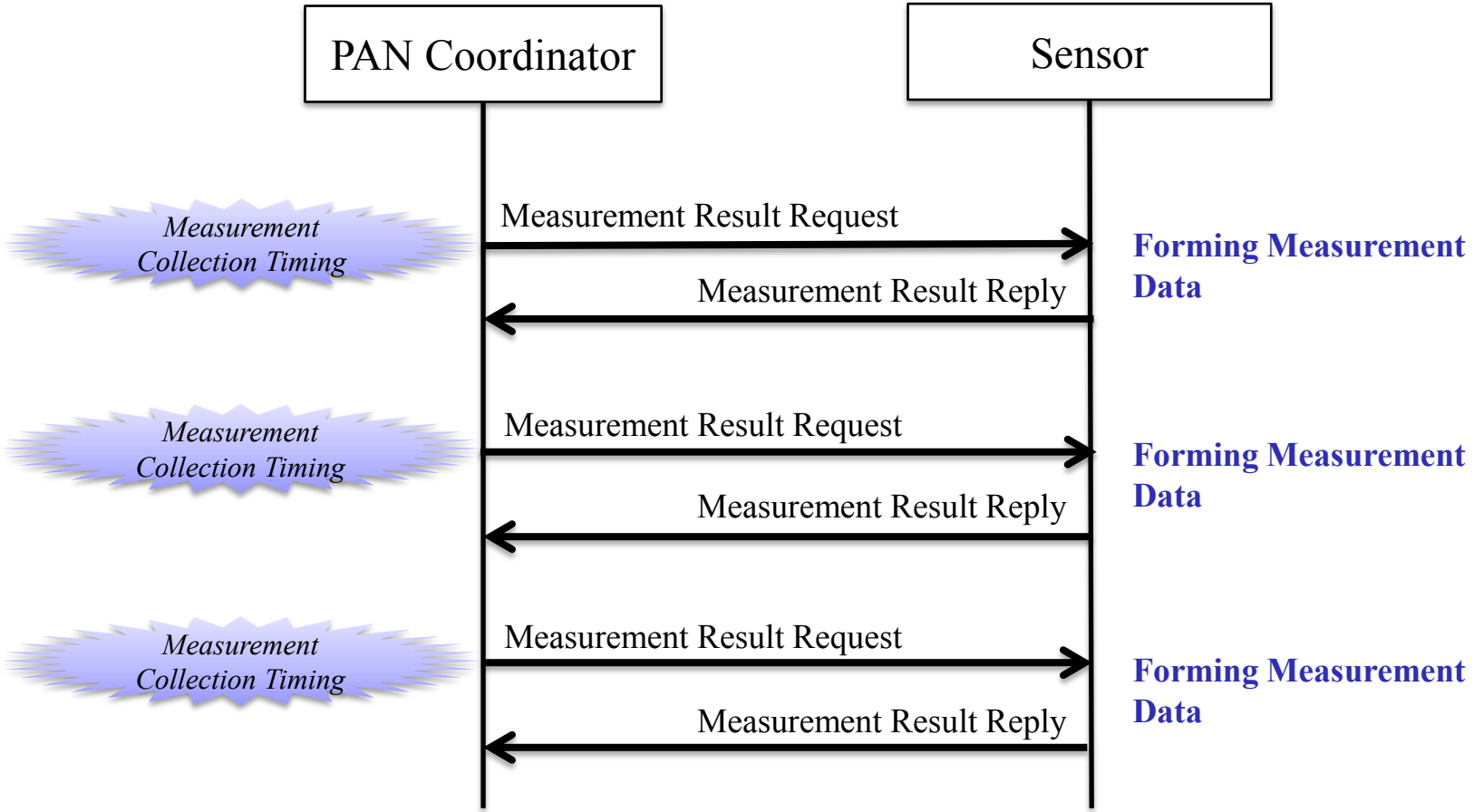
Measurement Related Interface (Signalling Messages)

	Message Name	Payload Size	Signalling Direction	Notes
1	Sensor Reset Request	2 byte	PAN Coordinator > Sensor	
2	Sensor Reset Reply	2 byte	Sensor > PAN Coordinator	
3	Measurement Result Request	2 byte	PAN Coordinator > Sensor	
4	Measurement Result Report	4*N* byte	Sensor > PAN Coordinator	(4 byte/ch) x *N* ch
5	Measurement Result Error	2 byte	Sensor > PAN Coordinator	

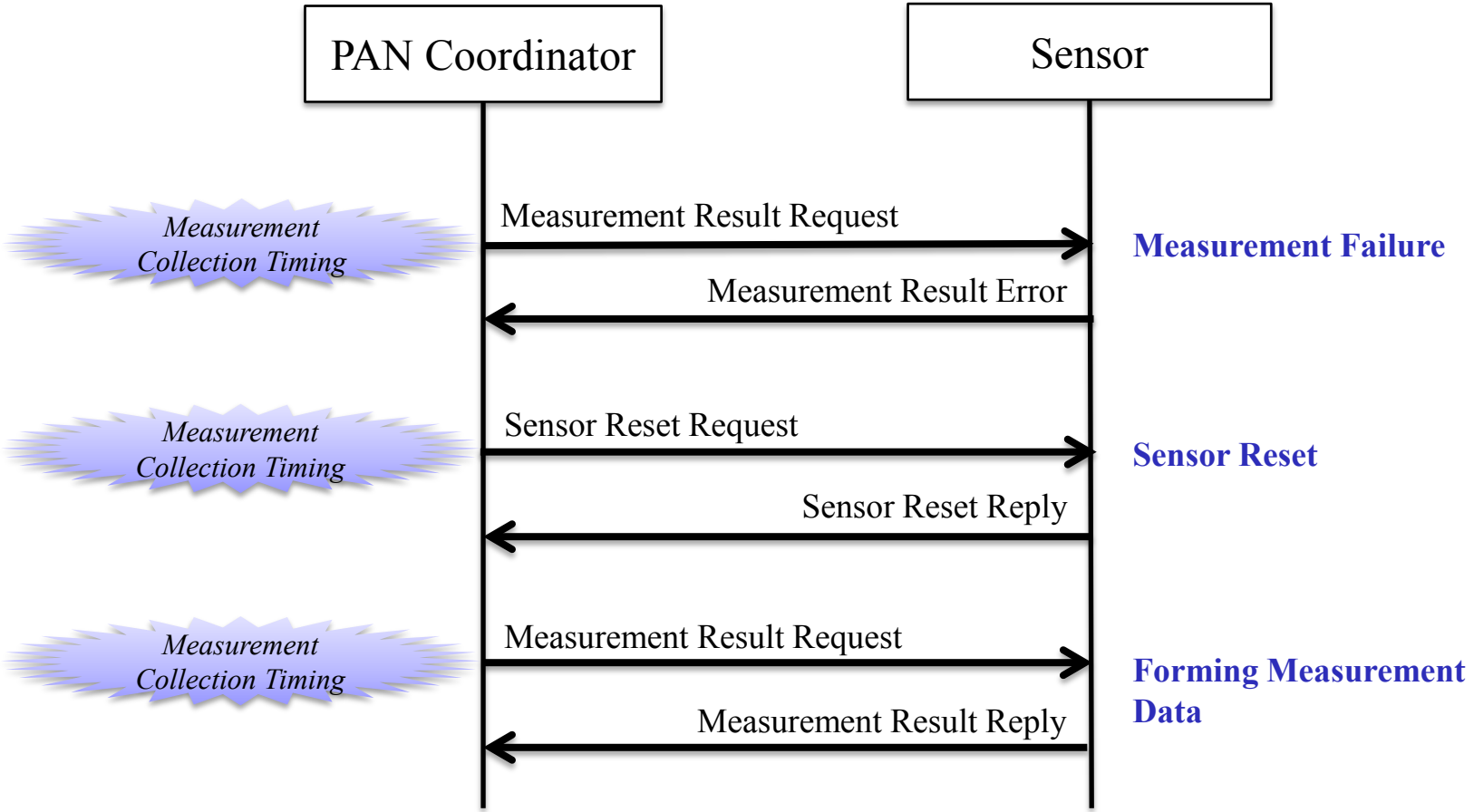
Measurement Related Message Sequence (1/4) – Confirmation of Measurement Link –



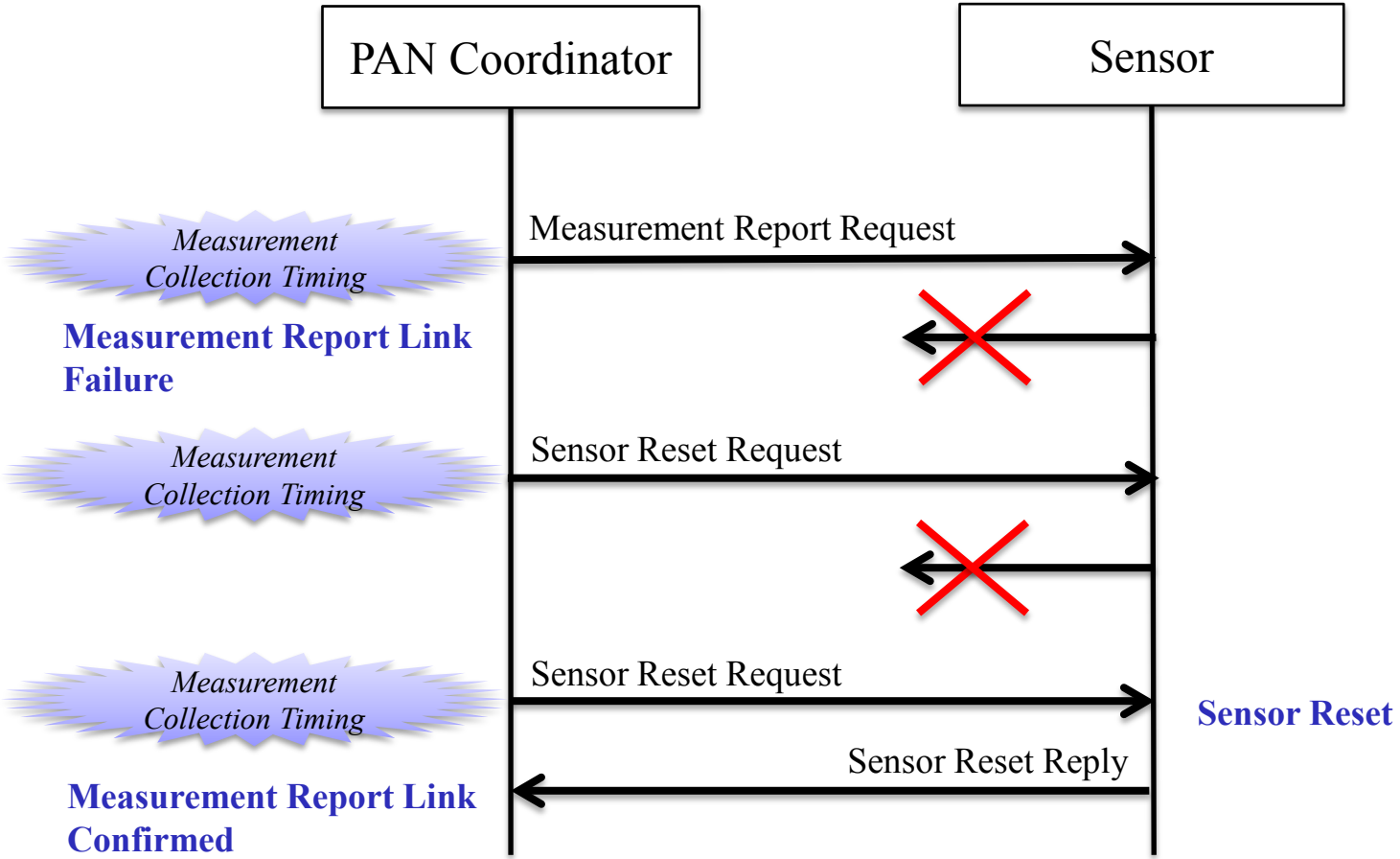
Measurement Related Message Sequence (2/4) – Reporting of Measurements (success) –



Measurement Related Message Sequence (3/4) – Reporting of Measurements (failure) –



Measurement Related Message Sequence (4/4) – Reporting of Measurements (no response) –



References

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2. SRU by Radio Resource Measurement & Management for the enhanced reliability (15-13-0132-02)
3. Proposal of radio resource management architecture (15-13-0285-01)
4. A Use Case of Self-Organizing Wireless Network for Medical System (15-13-0306-00)
5. Establishing a Study Group for a Spectrum Resource Utilization (SRU) through Radio Resource Measurement and Management for WPANs (15-13-0404-01)
6. Evaluation of Impact of Spectrum Sensing Duration (15-13-0438-00)