Project	IEEE P802.15.4G Working Group for Wireless Personal Area Networks
Title	802.15.4G SUN Device Classifications
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Re	Task Group 15.4g
Abstract	This document is a draft of an amendment for Clause 5, 6, 7 containing the operational detail of the Device Classification Operation
Purpose	Review

Draft

5.1a Smart Utility Networks Summary

A true modern Smart Grid enables multiple applications to operate over a shared, interoperable network, similar in concept to the way the Internet works today. To put this in perspective, the electrical network in the US alone is comprised of more than 300,000,000 metering endpoints, 14,000 transmission substations, 4,500 large substations for distribution, and 3,000 public and private owners.

5.2a Device class components of the P802.15.4g WPAN

In order to ensure that the wireless grid communications requirements are addressed in the most efficient manner possible, this draft standard defines three unique device classes to provide the capability of utilizing the most efficient methods of data transmission. The device class boundaries have been established based on the expected volumes of data to be transmitted during a typical 24-hour period. Each device class utilizes unique signaling attributes in order to maximize overall system performance.

Device Class A is defined as a class of devices forming a network capable of efficiently supporting data throughput for an average greater than 10,000,000 symbols per supported node during a single continuous 24-hour period.

Device Class B is defined as a class of devices forming a network capable of efficiently supporting data transfer for an average range of 10,000 symbols through 10,000,000 Symbols per supported node during a single continuous 24-hour period.

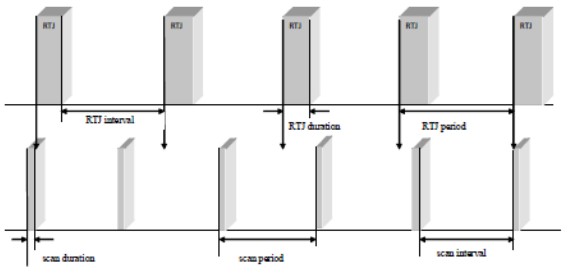
Device Class C is defined as a class of devices forming a network capable of efficiently supporting data transfer on an average of less than 10,000 symbols per supported node during in a single continuous 24-hour period.

7.5.8a Common signaling mode (CSM)

The CSM is defined as the mandatory mode for a given band defined in 6.1.1, 6.12a, 6.12b, 6.12c.
The CSM mode will be used to communicate the RTJ and RTJR commands defined in 7.3.9a and 7.3.9b

7.5.8b Common signaling mode monitoring

SUN devices will periodically monitor the CSM for RTJ commands during periods of inactivity.
SUN devices will utilize the passive channel scan capability defined in 7.5.2.1.3
to scan for the RTJ signals.



(k) = Integer

scan interval = (k) beacon period

$$\#\ \text{of scans to converge} = \frac{\text{RTJ period}}{\text{scan duration}}$$

Example

Beacon Period mS	1000	BI+BD
Beacon Duration mS	100	
Beacon Interval mS	900	
Scan Period mS	1015	SI+SD
Scan Duration mS	15	
Scan Interval mS	1000	K*BP
k	1	
Number of scans	66.67	
Max Scan Time S	676.67	SP*nS

Average scan time = Max Scan Time /2

Figure 112a—Channel scan duration and interval

7.3.9a Request to join (RTJ) command

The RTJ command allows a low energy discovery mechanism to be used by a device to advertise to other devices that it wishes to and is capable of joining an existing PAN (beacon-enabled or nonbeacon-enabled). This command shall be sent by an unassociated device that wishes to discover and associate with a PAN.

The Source Addressing Mode subfield of the Frame Control field shall be set to three (i.e., 64-bit extended addressing). The Destination Addressing Mode subfield of the Frame Control field shall be set to two (i.e., 16-bit short addressing).
The Frame Pending subfield of the Frame Control field shall be set to zero and ignored upon reception. The Acknowledgment Request subfield and Security Enabled subfield shall be set to zero.
The Destination PAN Identifier field shall contain the broadcast PAN identifier (i.e., 0xffff). The Destination Address field shall contain the broadcast short address (i.e., 0xffff).

octets: (see 7.2.2.4)	1
MHR fields	Command Frame Identifier (see Table 123)

Figure 103a—RTJ command format

7.3.9b Request to joint response (RTJR) command

The RTJR is issued by a device upon receipt of the RTJ command.
The RTJR acknowledges the request and provides the current value of the PAN coordinators PIB attribute *phyCurrentSUNPageEntry* defined in 6.4.2 table 31 that corresponds to the PHY operating mode currently in use by the existing network.

Following the successful reception of the RTJR, the joining device will use the PHY mode attributes defined in the *phyCurrentSUNPageEntry* to perform the standard association process defined in 7.1.3

The Source Addressing Mode and Destination Addressing Mode subfields of the Frame Control field shall both be set to three (i.e., 64-bit extended addressing).
The Frame Pending subfield of the Frame Control field shall be set to zero and ignored upon reception. The Acknowledgment Request subfield and Security Enabled subfield shall be set to zero.
The Destination PAN Identifier field shall contain the PAN identifier assigned to the responding device if it is a PAN coordinator, or set to the broadcast PAN ID (i.e., 0xffff) if the device is not a PAN coordinator.
The Destination Address field shall contain an extended address equal to the source address of the received RTJ command

octets: (see 7.2.2.4)	1	4
MHR fields	Command Frame Identifier (see Table 123)	phyCurrentSUNPageEntry (see table 31)

Figure 103b-RTJR command format

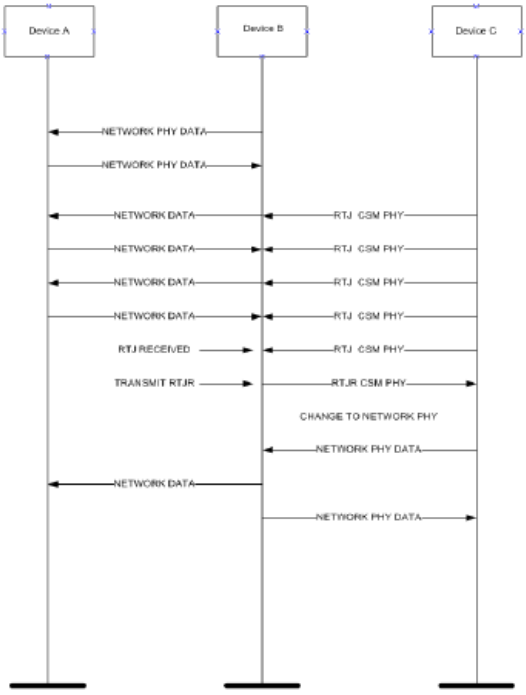


Figure 112b—RTJ/RTJR packet sequence