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Title	Subscriber Mode Management
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Re:	Call for Comment on P802.16g Baseline Document
Abstract	This contribution proposes subscriber mode management.
Purpose	The document should be considered during the resolution of comments on the baseline document.
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Subscriber Mode Management

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Problem Statement

In this contribution, we summarize subscriber mode management at an MS, a BS, and an NCMS, and introduce currently defined service primitives for subscriber mode management between a BS and an NCMS, which are exchanged through Control Service Access Point (C-SAP) of Management Plane specified in IEEE 802.16g baseline document.

Summary of the Proposed Remedy

In Normal Operation, an MS transmits and receives packets to/from a BS. Currently, two subscriber modes are defined, i.e., Sleep and Idle Modes. Sleep Mode is intended to minimize an MS power usage and decrease usage of serving BS air interface resources by pre-negotiated periods of absence from the serving BS air interface. Idle Mode allows an MS to become periodically available for DL broadcast traffic without registration at a specific BS as the MS traverses an air link environment populated by multiple BSs, and thus, allows the MS to conserve power and operational resources.

Sleep Mode operation is defined between an MS and a BS only, and an NCMS does not need to manage Sleep Mode of subscriber. Thus, both an MS and a BS manage all Normal Operation, Sleep Mode, and Idle Mode of subscriber. On the other hand, an NCMS manages Normal Operation and Idle Mode. In this contribution, Subscriber Mode transitions at an MS, a BS, and an NCMS are modeled and described, as shown in Figs. 1 and 2.

Figure 1 shows Subscriber Mode transition diagram at both an MS and a BS. Subscriber Mode at both an MS and a BS changes from Normal Operation to Idle Mode when the MS issues an MS De-registration Request (DREG-REQ) message with De-Registration_Request_Code=0x01 or the BS issues an De-register Command (DREG-CMD) message with Action Code = 0x05. Then, the MS stays at Idle Mode and updates its location when the paging group changes. The Subscriber Mode returns back to Normal Operation from Idle Mode after completing Network re-entry. Transition from Normal Operation to Sleep Mode is performed after an MS successfully exchanges Sleep Request (MOB_SLP-REQ) and Sleep Response (MOB_SLP-RSP) messages with a BS. If there is any DL traffic toward an MS from a BS, MOB_TRF-IND is broadcast to the MS from the BS and Subscriber Mode of the MS and the BS changes from Sleep Mode to Normal Operation. If there is any UL traffic from an MS, Bandwidth Request (BW Request) is sent to the serving BS from the MS and Subscriber Mode of the MS and the BS changes from Sleep Mode to Normal Operation, too.

Figure 2 shows Subscriber Mode transition diagram at an NCMS with service primitives related with the Subscriber Mode transition. Subscriber Mode transition from Normal Operation to Idle Mode is performed by exchanging Idle_mode_initiation.request and Idle_mode_initiation.response between a BS and an NCMS after successful DREG-REQ message with De-Registration_Request _Code=0x01 or DREG-CMD message with Action Code = 0x05 between an MS and a BS, where Idle_mode_initiation.request and Idle_mode_initiation.response are defined in 14.5.11.1 and 14.5.11.2, respectively. Subscriber Mode transition from Idle Mode to Normal Operation is initiated

after exchanging Paging_announce, Idle_ReEntry.indication, and Idle_ReEntry.confirmation between a BS and an NCMS, where Paging_announce, Idle_ReEntry.indication, and Idle_ReEntry. confirmation are defined in 14.5.11.3, 14.5.11.4, and 14.5.11.5, respectively.

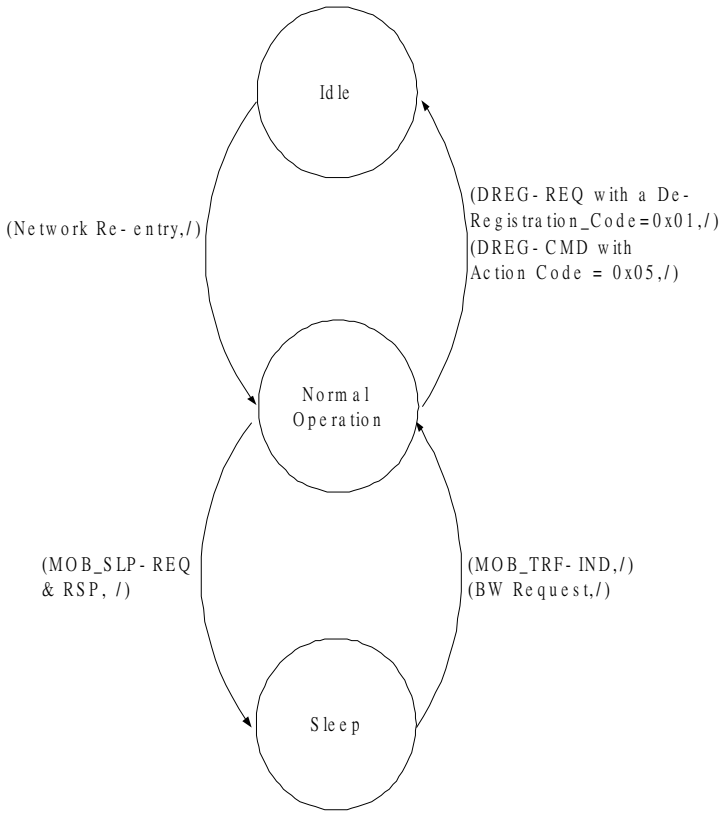

Fig. 1- Subscriber Mode transition diagram at an MS and a BS

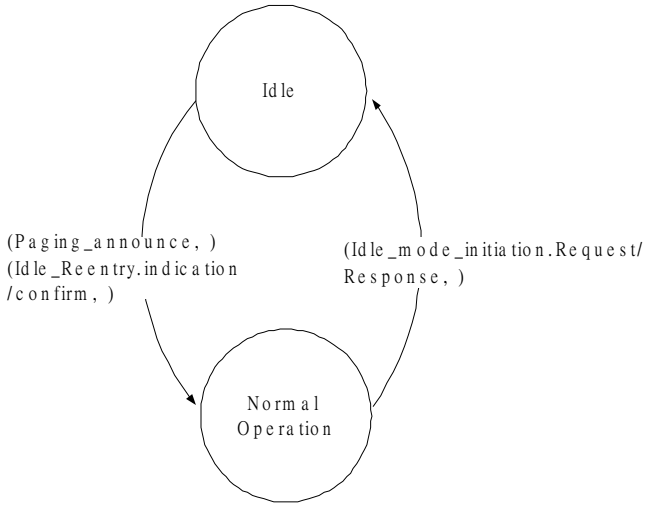

Fig. 2 - Subscriber Mode transition diagram at an NCMS

Proposed Text Changes

[Modify section 14.5.7 as follow]

14.5.7 Subscriber Mode Management

The following informative subsection describes subscriber mode management.

14.5.7.1 Managing Device States

In Normal Operation, an MS transmits and receives packets to/from a BS. Currently, two subscriber modes are defined, i.e., Sleep and Idle Modes. Sleep Mode is intended to minimize an MS power usage and decrease usage of serving BS air interface resources by pre-negotiated periods of absence from the serving BS air interface. Idle Mode allows an MS to become periodically available for DL broadcast traffic without registration at a specific BS as the MS traverses an air link environment populated by multiple BSs, and thus, allows the MS to conserve power and operational resources.

Sleep Mode operation is defined between an MS and a BS only, and an NCMS does not need to manage Sleep Mode of subscriber. Thus, both an MS and a BS manage all Normal Operation, Sleep Mode, and Idle Mode of subscriber. On the other hand, an NCMS manages Normal Operation and Idle Mode. In this contribution, Subscriber Mode transitions at an MS, a BS, and an NCMS are modeled and described, as shown in Figs. 1 and 2.

Figure 3 shows Subscriber Mode transition diagram at both an MS and a BS. Subscriber Mode at both an MS and a BS changes from Normal Operation to Idle Mode when the MS issues an MS De-registration Request (DREG-REQ) message with De-Registration_Request_Code=0x01 or the BS issues an De-register Command (DREG-CMD) message with Action Code = 0x05. Then, the MS stays at Idle Mode and updates its location when the paging group changes. The Subscriber Mode returns back to Normal Operation from Idle Mode after completing Network re-entry. Transition from Normal Operation to Sleep Mode is performed after an MS successfully exchanges Sleep Request (MOB_SLP-REQ) and Sleep Response (MOB_SLP-RSP) messages with a BS. If there is any DL traffic toward an MS from a BS, MOB_TRF-IND is broadcast to the MS from the BS and Subscriber Mode of the MS and the BS changes from Sleep Mode to Normal Operation. If there is any UL traffic from an MS, Bandwidth Request (BW Request) is sent to the serving BS from the MS and Subscriber Mode of the MS and the BS changes from Sleep Mode to Normal Operation, too.

Figure 4 shows Subscriber Mode transition diagram at an NCMS with service primitives related with the Subscriber Mode transition. Subscriber Mode transition from Normal Operation to Idle Mode is performed by exchanging Idle_mode_initiation.request and Idle_mode_initiation.response between a BS and an NCMS after successful DREG-REQ message with De-Registration_Request _Code=0x01 or DREG-CMD message with Action Code = 0x05 between an MS and a BS, where Idle_mode_initiation.request and Idle_mode_initiation.response are defined in 14.5.11.1 and 14.5.11.2, respectively. Subscriber Mode transition from Idle Mode to Normal Operation is initiated after exchanging Paging_announce, Idle_ReEntry.indication, and Idle_ReEntry.confirmation between a BS and an NCMS, where Paging_announce, Idle_ReEntry.indication, and Idle_ReEntry. confirmation are defined in 14.5.11.3, 14.5.11.4, and 14.5.11.5, respectively.

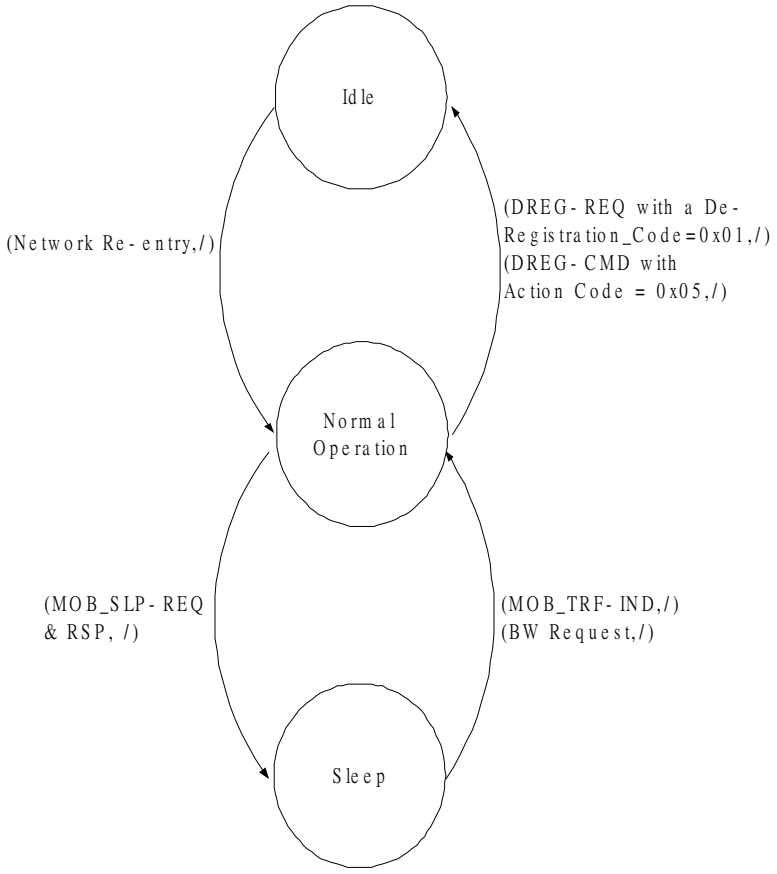

Fig. 3 - Subscriber Mode transition diagram at MS and BS

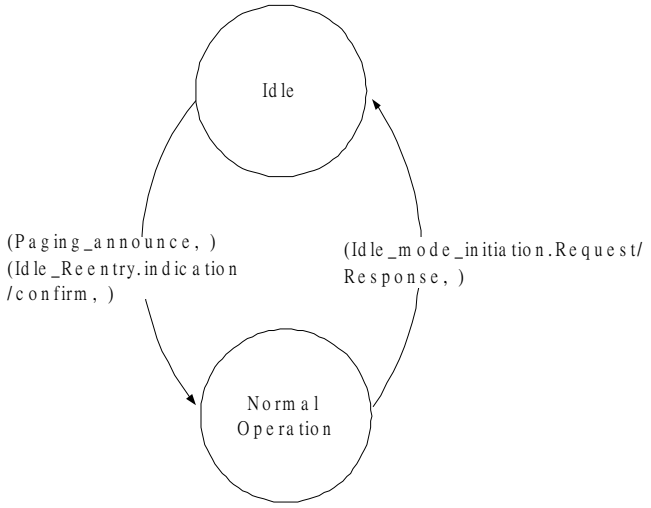

Fig. 4 - Subscriber Mode transition diagram at NCMS

References

[1] IEEE 802.16e/D9
[2] IEEE 802.16g-04/03r3, "Baseline Document – P802.16g Management Plane Procedures and Services"
[3] IEEE Std 802-16-2004