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Abstract	This contribution proposes service primitives for accounting.
Purpose	The document should be considered during the resolution of comments on the baseline document.
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Amendment to Subscriber Mode Management in Section 14.2.6

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1. Introduction

In Section 14.2.6, subscriber mode management is described, where subscriber mode consists of Normal Mode, Idle Mode, and Sleep Mode. The current subscriber mode management, however, only deals with modes when an MS is attached to a BS after initial network entry. Thus, the subscriber mode transition diagrams at MS, BS, and NCMS start from Normal Mode. However, we think that the subscriber mode should include a new mode, called Detached Mode, where an MS is not attached to a BS, and the subscriber mode transition diagrams should start from the detached mode, as many other mobile systems do. In this contribution, we define Detached Mode and modify the subscriber mode transition diagrams accordingly.

2. Proposed Text Changes

[Modify section 14.2.6 as follow]

14.2.6 Subscriber mode management

The following informative subsection describes subscriber mode management

14.2.6.1 Managing device states

Currently, four subscriber modes are defined, i.e., Detached Mode, Normal Mode, Sleep Mode, and Idle Mode. In Detached Mode, the subscriber is not connected to a BS, and the MS, BS, and NCMS do not have any location and state information for the subscriber. After initial network entry procedure, the MS moves to Normal Mode. In Normal ~~Operation~~Mode, 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 the NCMS does not need to manage Sleep Mode of subscriber. Thus, both an MS and a BS manage all Detached Mode, Normal ~~Operation~~Mode, Sleep Mode, and Idle Mode of subscriber. On the other hand, the NCMS manages Detached Mode, Normal ~~Operation~~, and Idle Mode. Subscriber Mode transitions at an MS, BS and the NCMS are illustrated in Figures ~~490~~493 and ~~491~~494.

Figure 493 shows Subscriber Mode transition diagram at both an MS and a BS. Initially, the subscriber mode is Detached Mode and the subscriber mode at both an MS and a BS changes from Detached Mode to Normal Mode after initial network entry procedure. Subscriber Mode at both an MS and a BS changes from Normal Operation Mode 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 Mode from Idle Mode after completing nNetwork re-entry. Transition from Normal Operation Mode 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 OperationMode. 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. Transition to Detached Mode from Normal Mode occurs when the MS sends DREG-REQ message without Deregistration_Code=0x01 or receive DREG-CMD without Action Code = 0x05. Transition to Detached Mode from Idle Mode occuesoccurs when the Idle Mode Timer of the MS is expired.

Editorial note: IP address release not addressed yet when transitioning from Idle Mode directly to Detached Mode.

If MS is switched off in any of Normal, Idle, and Sleep Modes, the state moves to Detached Mode.

Figure 494 shows Subscriber Mode transition diagram at the NCMS with service primitives related with the Subscriber Mode transition. Initially, the subscriber mode is Detached Mode and the subscriber mode at NCMS changes from Detached Mode to Normal Mode after initial network entry procedure of MS. Subscriber Mode transition from Normal Operation Mode to Idle Mode is performed by exchanging C-PG-REQ and C-PG-RSP between a BS and the 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 C-PG-REQ and C-PG-RSP are defined in 14.2.6.2.1 and 14.2.6.2.2, respectively. Subscriber Mode transition from Idle Mode to Normal Operation Mode is initiated after exchanging C-PGNOTFY, C-PG-RSP, and C-PG-ACK between a BS and the NCMS, where C-PG-NOTFY, C-PG-RSP, and C-PG-ACK are defined in 14.2.6.2.4, 14.2.6.2.2, and 14.2.6.2.3, respectively. Transition to Detached Mode from Normal Mode occurs by exchanging C-PG-REQ and C-PG-RSP between a BS and the NCMS after successful DREG-REQ message without De-Registration_Request_Code=0x01 or DREG-CMD message without Action Code = 0x05 between an MS and a BS. Transition to Detached Mode from Idle Mode occurs when the Idle Mode System Timer is expired. If MS is switched off in either Normal or Idle Mode, the state moves to Detached Mode.
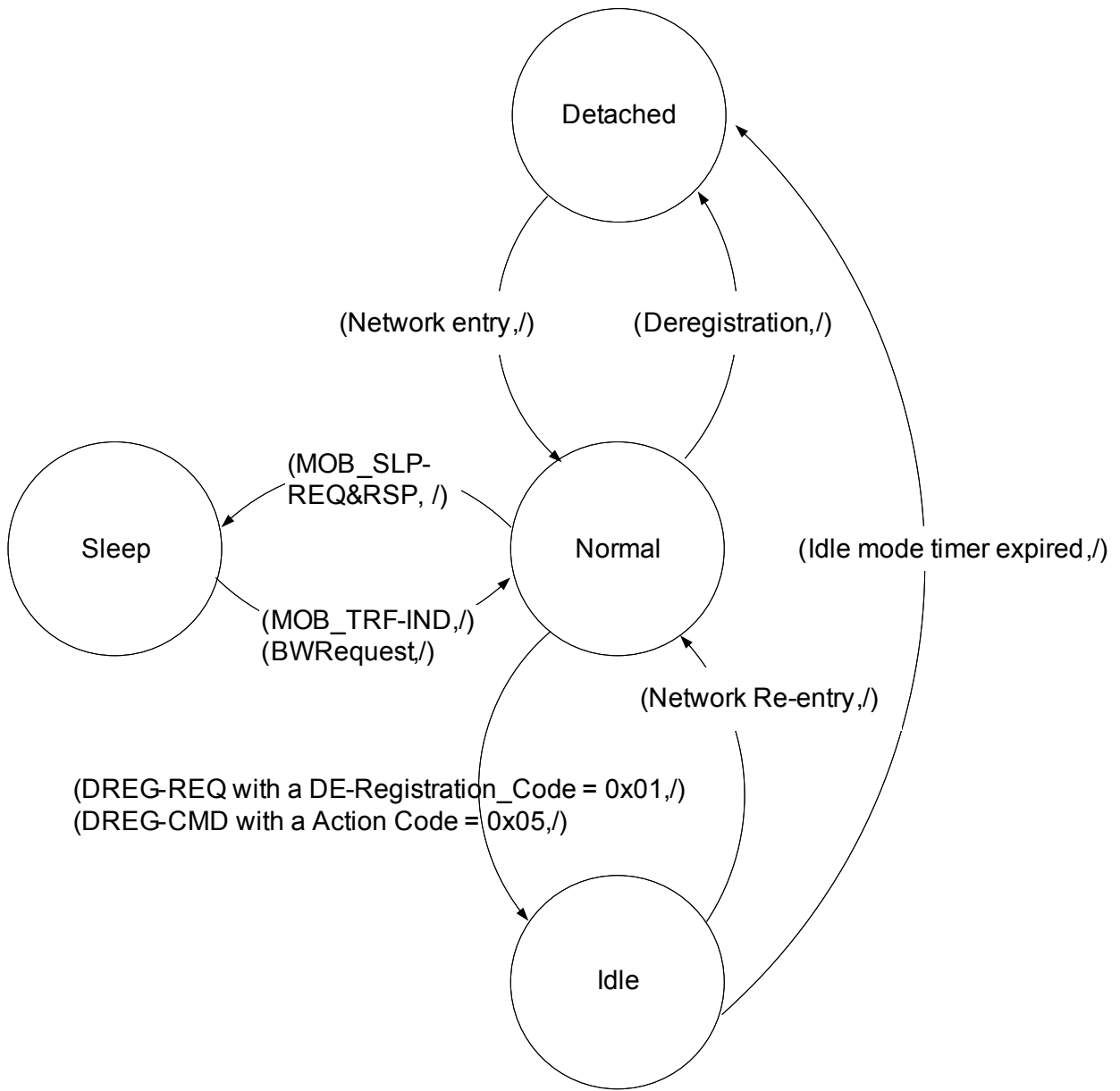
Detached

(Network entry,/)   (Deregistration,/)

(MOB_SLP-
REQ&RSP, /)

Sleep   Normal   (Idle mode timer expired,/)

(MOB_TRF-IND,/)
(BWRequest,/)

(Network Re-entry,/)

(DREG-REQ with a DE-Registration_Code = 0x01,/)
(DREG-CMD with a Action Code = 0x05,/)

Idle

Figure 493 Subscriber mode transition diagrams of MS & BS

Editorial note: IP address release not addressed yet.

Detached

(Network entry ,/)   (Deregistration,/)

(Idle mode System timer expired ,/)
(C-PG-REQ(LocationUpdate(PowerDown)),
C-PG-RSP)

Normal

(C-PG-REQ(Idle_Mode_Initiation),
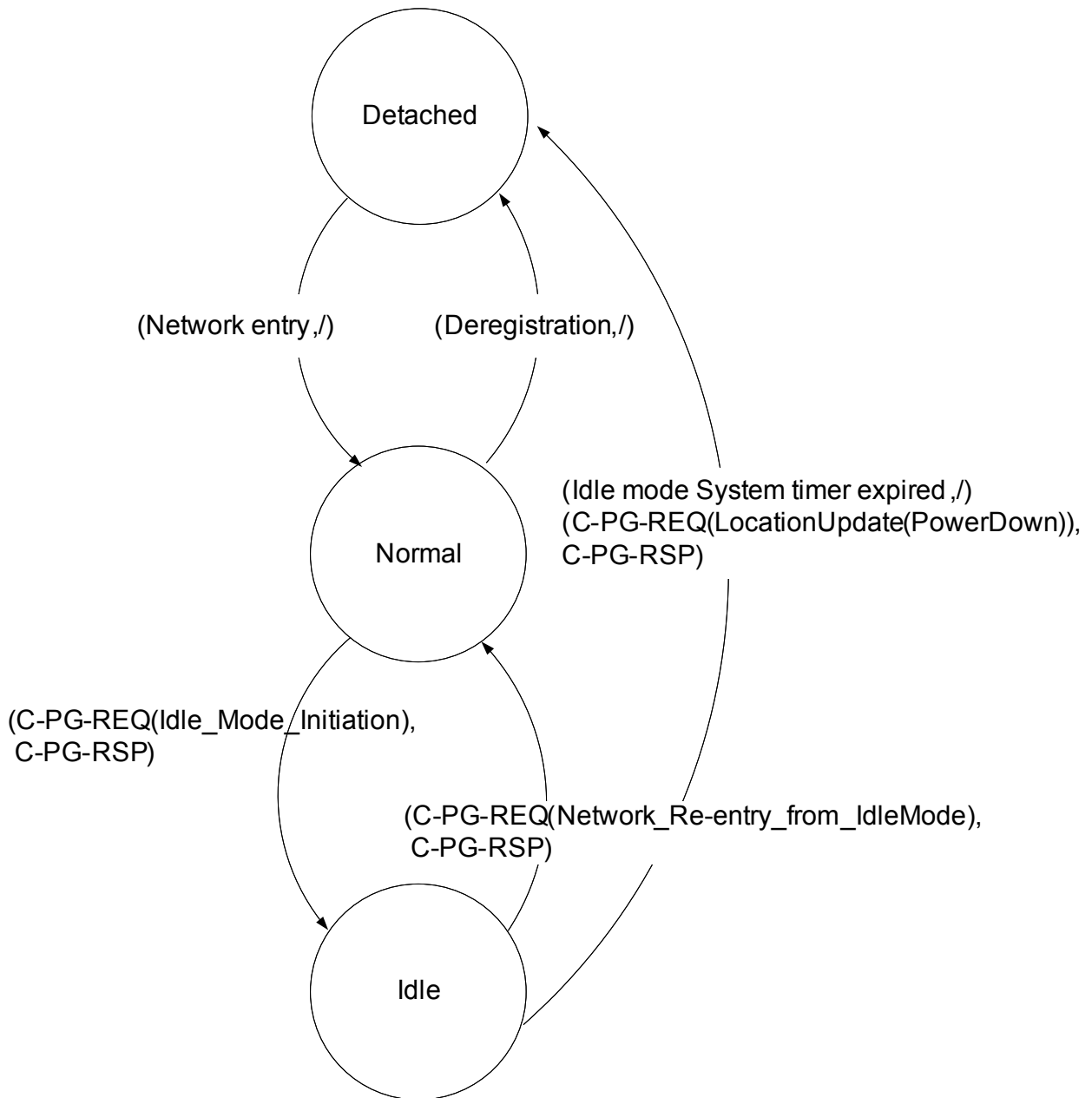C-PG-RSP)

(C-PG-REQ(Network_Re-entry_from_IdleMode),
C-PG-RSP)

Idle

Figure 494 Subscriber mode transition diagrams of NCMS