Task Details

***EDRX***

In 3GPP networks, specifically in the context of the S6a/S6d interface between the MME (Mobility Management Entity) and the HSS (Home Subscriber Server), the Update Location Request (ULR) message is used by the MME to inform the HSS about a UE's current location and to request subscriber profile data.

Here's how eDRX (extended Discontinuous Reception) and RAT-Type (Radio Access Technology Type) are handled in this flow:

1. **RAT-Type in ULR**: The RAT-Type AVP (Attribute-Value Pair) is a mandatory parameter in the ULR message. It indicates the radio access technology that the MME is currently serving the UE on. If the UE is served over 4G, the RAT-Type in the ULR will be set to EUTRAN. This AVP carries a single value to specify the current RAT.

2. **eDRX Configuration**: eDRX is a power-saving feature for IoT devices that allows them to sleep for extended periods. The eDRX configuration, including the eDRX-Cycle-Length, is part of the subscriber's profile stored in the HSS.

3. **eDRX in ULR vs. ULA**:

**•** The **ULR** (from MME to HSS) does **not** carry eDRX configuration values. Its purpose is to request subscriber data, including eDRX parameters, from the HSS. The MME sends the ULR to inform the HSS of its identity and the RAT type it's serving.

**•** The **ULA** (Update Location Answer, from HSS to MME) is where the eDRX configuration is sent. The HSS sends the eDRX-Cycle-Length-Request AVP in the ULA to the MME. This AVP contains the eDRX cycle length value applicable to the subscriber.

4. **"Configuring two eDRX for DATA\_4G"**:

**•** Typically, a subscriber would have one eDRX-Cycle-Length provisioned per RAT type (e.g., one for EUTRAN, one for NB-IoT).

**•** If, conceptually, "two eDRX for DATA\_4G" implies that the HSS has multiple possible eDRX values for a subscriber's 4G data services, the HSS would logically select the applicable or preferred eDRX-Cycle-Length value based on its internal logic and the RAT-Type received in the ULR. The eDRX-Cycle-Length-Request AVP itself is defined to carry a single Unsigned32 value, meaning the HSS would send only one specific eDRX cycle length to the MME in the ULA.

In summary, when a ULR is sent with RAT-Type as EUTRAN for a DATA\_4G connection:

**•** The RAT-Type in the ULR will only contain the EUTRAN value.

**•** The ULR does not carry any eDRX values. The eDRX values are sent from the HSS to the MME in the ULA. If multiple eDRX values are provisioned in the HSS for DATA\_4G, the HSS will send the single, applicable eDRX-Cycle-Length in the ULA.

***PS & SMS Only Flag***

The "PS and SMS only" flag (or similar indications in subscriber data) is a subscription parameter that dictates the services a subscriber is allowed to use. It means the subscriber is provisioned for Packet Switched (PS) domain services (which includes mobile data/internet) and SMS, but typically **not** for Circuit Switched (CS) voice services.

Here's how it relates to 2G, 3G, and 4G:

**• Packet Switched (PS) Services**: PS services are what enable mobile data/internet access. All generations (2G, 3G, 4G, 5G) support PS services, though with increasing speeds and efficiency.

**• 2G (GSM/GPRS/EDGE)**: Introduced GPRS (General Packet Radio Service) and EDGE, which are PS technologies for data.

**• 3G (UMTS/HSPA)**: Significantly improved PS data speeds.

**• 4G (LTE)**: Is an all-IP (Packet Switched) network. Voice services (VoLTE) and SMS are also carried over the PS domain in 4G networks.

**• Circuit Switched (CS) Services**: Traditionally, 2G (GSM) and 3G (UMTS) networks used Circuit Switched (CS) for voice calls and SMS.

**•** 4G (LTE) networks do not have CS nodes; they are data-only. To make voice calls on 4G, technologies like VoLTE (Voice over LTE) are used, which carry voice over the PS domain. For SMS, "SMS in MME" (over EPS NAS signalling) or SMS over IP can be used in 4G.

**The "PS and SMS only" flag is a subscription setting in the HSS (Home Subscriber Server) that limits a subscriber to PS domain services and SMS.**

**•** This flag is independent of the specific RAT (2G, 3G, 4G) in the sense that if a subscriber has this flag set, they can use PS data and SMS over any available RAT that supports these services.

**•** For example, a device with a "PS and SMS only" subscription could connect to a 2G/3G network for GPRS/UMTS data and SMS, or to a 4G network for LTE data and SMS (via SMS in MME or SMS over IP).

**•** The flag's purpose is to indicate that the subscriber should *not* be allowed to establish traditional CS voice calls, even if connected to a 2G or 3G network that supports CS voice.

**•** It's often used for Machine Type Communication (MTC) devices or IoT devices where only data and SMS capabilities are required, and voice calls are unnecessary.

In essence, the "PS and SMS only" flag is a **service provisioning parameter** in the subscriber's profile, and it applies across the different generations of mobile networks (2G, 3G, 4G) as long as those networks can provide the specified services (PS data and SMS). The network elements (like the MME or SGSN) receive this flag from the HSS and enforce the service limitations based on the RAT the UE is connected to.

***SIMS***

n the real world of telecommunications, an active subscriber's MSISDN (Mobile Station International Subscriber Directory Number), which is essentially their phone number, can change for several reasons, primarily at the subscriber's request or due to specific operational needs of the network operator.

Here are the main scenarios where an active subscriber's MSISDN might change:

1. **Subscriber Request (Number Change)**:

**• Spam or Harassment**: A common reason for a subscriber to request a number change is if they are frequently receiving unwanted spam calls, SMS messages, or are being harassed. Changing their MSISDN can provide immediate relief from such issues.

**• Privacy Concerns**: Subscribers might want a new number for privacy reasons, especially if their old number has become widely known or compromised.

**• Personal Preference**: Sometimes, a subscriber simply desires a new number for personal reasons.

2. **Number Portability (Less Common for *Changing* MSISDN, More for *Keeping* it)**:

**•** While Mobile Number Portability (MNP) allows subscribers to keep their MSISDN when changing service providers, it's worth noting that if a subscriber *didn't* port their number and instead chose a new number with the new provider, their MSISDN would change.

3. **Operator-Initiated Changes (Rare for Active Subscribers)**:

**• Number Range Reorganization**: Although problematic for active subscribers due to the MSISDN's role in routing and HLR location, network operators might, in very rare circumstances, need to reorganize number series due to capacity issues or network restructuring. This could theoretically lead to a number change, though operators generally try to avoid this for active subscribers due to the disruption it causes.

**• Technical Issues/System Errors**: In extremely rare cases, unforeseen technical issues or errors in the operator's billing or provisioning systems might necessitate a number change.

It's important to distinguish the MSISDN from other identifiers:

**• IMSI (International Mobile Subscriber Identity)**: This unique number is stored on the SIM card and identifies the subscriber to the mobile network for authentication and routing. The IMSI remains constant as long as the same SIM card is used, even if the MSISDN changes.,,

**• ICCID (Integrated Circuit Card Identifier)**: This is the serial number of the SIM card itself and is also unique to each physical SIM.

When an MSISDN changes, the subscriber's bundles and services typically remain unchanged. After the MSISDN replacement, the end-user usually receives an SMS requesting them to restart their device for the change to take effect.

**Web references:**

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