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Using the Mobile Equipment Identity (MEID) URN as an Instance ID

Abstract

This document specifies how the Uniform Resource Name (URN) namespace reserved for the Third Generation Partnership Project 2 (3GPP2) identities and its Namespace Specific String (NSS) for the Mobile Equipment Identity (MEID) can be used as an Instance ID. The purpose of this Instance ID is to fulfill the requirements for defining how a specific URN needs to be constructed and used in the "+sip.instance" Contact header field parameter for outbound behavior.

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1. Introduction

This document specifies how the Uniform Resource Name (URN) namespace reserved for Third Generation Partnership Project 2 (3GPP2) identities and its Namespace Specific String (NSS) for the Mobile Equipment Identity (MEID) as specified in RFC 8464 [10] can be used as an Instance ID as specified in RFC 5626 [4] and also as used by RFC 5627 [5].

RFC 5626 [4] specifies the "+sip.instance" Contact header field parameter that contains a URN as specified in RFC 8141 [6]. The Instance ID uniquely identifies a specific User Agent (UA) instance. This Instance ID is used as specified in RFC 5626 [4] so that the Session Initiation Protocol (SIP) registrar (as specified in RFC 3261 [2]) can recognize that the contacts from multiple registrations correspond to the same UA. The Instance ID is also used as specified by RFC 5627 [5] to create Globally Routable User Agent URIs (GRUUs) that can be used to uniquely address a UA when multiple UAs are registered with the same Address of Record (AoR).

RFC 5626 [4] requires that a UA SHOULD create a Universally Unique Identifier (UUID) URN as specified in RFC 4122 [9] as its Instance ID but allow for the possibility to use other URN schemes.

RFC 5626 [4] states:

If a URN scheme other than UUID is used, the UA MUST only use URNs for which an RFC (from the IETF stream) defines how the specific URN needs to be constructed and used in the "+sip.instance" Contact header field parameter for outbound behavior.

This specification meets this requirement by specifying how the 3GPP2 MEID URN is used in the "+sip.instance" Contact header field parameter for outbound behavior and RFC 8464 [10] specifies how the 3GPP2 MEID URN is constructed.

The 3GPP2 MEID URN is a URN for the MEID a globally unique identifier that identifies mobile devices used in the 3GPP2 networks. The MEID allocation is managed by the 3GPP2 to ensure that the MEID values are globally unique. Details of the formatting of the MEID as a URN are specified in RFC 8464 [10] and the definition of the MEID is contained in 3GPP2 S.R0048-A [13].

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [1] [7] when, and only when, they appear in all capitals, as shown here.

3. Background

Mobile communication has been rapidly improved from low-bit-rate circuit-switched systems to the higher-data-rate packet-switched system. The packet-switched system has added the mobile capability of Internet Protocol (IP) connectivity; thereby, the IP Multimedia Subsystem (IMS) have made SIP-based calls and IP multimedia sessions from mobile devices possible.

3GPP2 defines High Rate Packet Data (HRPD) with high data rates, and it dispenses with the 1x Circuit Switched (1xCS) infrastructure. This means that with HRPD networks, voice calls will need to be conducted using IP and IMS. However, SIP-based IMS networks will take a great many years from the time of writing to transition to the use of all IP; mobile devices will need to operate in both IP/SIP/IMS mode and circuit-switched mode. This means that calls and sessions will need to be handed over between IP/SIP/IMS mode and circuit-switched mode mid-call or mid-session. To achieve this, the mobile device needs to simultaneously communicate via both the IP/SIP/IMS domain and the circuit-switched domain.

To meet this need, 3GPP2 has specified how to maintain voice-session continuity between the IP/SIP/IMS domain and the circuit-switched domain in 3GPP2 S.X0042-A [14].

In order for the mobile device to access SIP/IMS voice service via the circuit-switched domain, 3GPP2 has specified that a Mobile Switching Center (MSC) server will control mobile voice call setup

over the circuit-switched radio access while establishing the corresponding voice session in the core network using SIP/IMS. The specified MSC server operates either via an IMS Media Gateway Control Function (MGCF) or directly if it is enhanced by SIP interface. To enable this, the mobile device MUST be identified in both the lxCS and IP/SIP/IMS domains. The only mobile device identifier that is transportable using lxCS signaling is the MEID; therefore, the Instance ID included by the MGCF or the MSC server and the Instance ID directly included by the mobile device both need to be based on the MEID.

Additionally in order to meet the above requirements, the same MEID that is obtained from the circuit-switched signaling by the MSC server needs to be obtainable from SIP signaling so that it can be determined that both the SIP signaling and circuit-switched signaling originate from the same mobile device.

4. 3GPP2 Use Cases

1. The mobile device includes its MEID in the SIP REGISTER request so that the SIP registrar can perform a check of the Equipment Identity Register (EIR) to verify if this mobile device is allowed or barred from accessing the network for non-emergency services (e.g., because it has been stolen). If the mobile device is not allowed to access the network for non-emergency services, the SIP registrar can reject the registration. Thus, a barred mobile device is prevented from accessing the network for non-emergency services.
2. The mobile device includes its MEID in SIP INVITE requests used to establish emergency sessions. This is so that the Public Safety Answering Point (PSAP) can obtain the MEID of the mobile device for identification purposes if required by regulations.
3. The inclusion by the mobile device of its MEID in SIP INVITE requests used to establish emergency sessions is also used in the cases of unauthenticated emergency sessions to enable the network to identify the mobile device. This is especially important if the unauthenticated emergency session is handed over from the packet-switched domain to the circuit-switched domain. In this scenario, the MEID is the only identifier that is common to both domains. The Emergency Access Transfer Function (EATF), which coordinates the call transfer between the domains, can thus use the MEID to identify that the circuit-switched call is from the same mobile device that was in the emergency session in the packet-switched domain.

5. User Agent Client Procedures

A single mode 3GPP2 User Agent Client (UAC), which uses only 3GPP2 technology to transmit and receive voice or data, has an MEID as specified in 3GPP2 S.R0048-A [13]. The single mode 3GPP2 UAC that is registering with a 3GPP2 IMS network includes in the "sip.instance" media feature tag the 3GPP2 MEID URN according to the syntax specified in RFC 8464 [10] when performing the registration procedures specified in RFC 5626 [4] or RFC 5627 [5] (or any other procedure requiring the inclusion of the "sip.instance" media feature tag).

A UAC MUST NOT use the 3GPP2 MEID URN as an Instance ID except when registering with a 3GPP2 IMS network. When a UAC is operating in IMS mode, it will obtain the domain of the carrier's IMS network to register with, from the Universal Integrated Circuit Card (UICC), preconfiguration, or the network at the time of establishing the Packet Data Protocol (PDP) context. These three methods are carrier specific and are only performed by the carrier IMS networks. The UAC will also obtain the address of the IMS edge proxy to send the REGISTER request containing the MEID using information elements in the Attach response when it attempts to connect to the carrier's packet data network. When registering with a non-3GPP or non-3GPP2 IMS network, a UAC SHOULD use a UUID as an Instance ID as specified in RFC 5626 [4].

A UAC MUST NOT include the "sip.instance" media feature tag containing the 3GPP2 MEID URN in the Contact header field of non-REGISTER requests except when the request is related to an emergency session. Regulations can require that the MEID be provided to the PSAP. Any future exceptions to this prohibition require an RFC that addresses how privacy is not violated by such usage.

6. User Agent Server Procedures

A User Agent Server (UAS) MUST NOT include its "sip.instance" media feature tag containing the 3GPP2 MEID URN in the Contact header field of responses except when the response is related to an emergency session. Regulations can require the MEID to be provided to the PSAP. Any future exceptions to this prohibition require an RFC that addresses how privacy is not violated by such usage.

7. 3GPP/3GPP2 SIP Registrar Procedures

In 3GPP/3GPP2 IMS, when the SIP Registrar receives in the Contact header field a "sip.instance" media feature tag containing the 3GPP2 MEID URN according to the syntax specified in RFC 8464 [10], the SIP registrar follows the procedures specified in RFC 5626 [4]. The MEID

URN MAY be validated as described in the RFC 8464 [10]. If the UA indicates that it supports the extension in RFC 5627 [5] and the SIP Registrar allocates a GRUU according to the procedures specified in RFC 5627 [5], the Instance ID MUST be obfuscated when creating the "gr" parameter in order not to reveal the MEID to other UAs when the public GRUU is included in non-REGISTER requests and responses. 3GPP TS 24.229 [11] subclause 5.4.7A.2 specifies the mechanism for obfuscating the MEID when creating the "gr" parameter.

8. IANA Considerations

This document has no IANA actions.

9. Security Considerations

Since MEIDs, like other formats of Instance IDs, can be correlated to a user, they are personally identifiable information and MUST be treated as such. In particular, the "sip.instance" media feature tag containing the 3GPP2 MEID URN MUST NOT be included in requests or responses intended to convey any level of anonymity, as this could violate the user's privacy. RFC 5626 [4] states:

One case where a UA could prefer to omit the "sip.instance" media feature tag is when it is making an anonymous request or some other privacy concern requires that the UA not reveal its identity.

The same concerns apply when using the 3GPP2 MEID URN as an Instance ID. Publication of the 3GPP2 MEID URN to networks that the UA is not attached to or the UA does not have a service relationship with is a security breach; the "sip.instance" media feature tag MUST NOT be forwarded by the service provider's network elements when forwarding requests or responses towards the destination UA. The 3GPP2 MEID URN MUST NOT accidentally leak in other contexts, such as and in particular when application servers subscribe to user registration state using the event package defined in RFC 3680 [3]. Additionally, an Instance ID containing the 3GPP2 MEID URN identifies a mobile device and not a user. The Instance ID containing the 3GPP2 MEID URN MUST NOT be used alone as an address for a user or as an identification credential for a user. The GRUU mechanism specified in RFC 5627 [5] provides a means to create URIs that address the user at a specific device or UA.

Entities that log the Instance ID need to protect them as personally identifiable information. Regulations can require carriers to log SIP MEIDs.

In order to protect the "sip.instance" media feature tag containing the 3GPP2 MEID URN from being tampered with, those REGISTER requests containing the 3GPP2 MEID URN MUST be sent using a security mechanism such as Transport Layer Security (TLS) as specified in RFC 8446 [8] or any other security mechanism that provides equivalent levels of protection such as hop-by-hop security based upon IP Security (IPsec).

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This document draws heavily on RFC 8464 [10] and also on the style and structure used in RFC 7255 [12].

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