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# A URN Namespace for Device Identity and Mobile Equipment Identity (MEID)

## Abstract

This document defines a Uniform Resource Name (URN) namespace for the Third Generation Partnership Project 2 (3GPP2) and a Namespace Specific String (NSS) for the Mobile Equipment Identity (MEID). The structure of an MEID is 15 hexadecimal digits long and is defined in the 3GPP2 to uniquely identify each individual mobile equipment (e.g., a handset or mobile phone). The 3GPP2 has a requirement to be able to use an MEID as a URN. This document fulfills that requirement.

## Status of This Memo

This document is not an Internet Standards Track specification; it is published for informational purposes.

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Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at https://www.rfc-editor.org/info/rfc8464.

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## 1. Introduction

Mobile equipment that is either a) single-mode 3GPP using only 3GPP technology to transmit and receive voice or data or b) dual-mode 3GPP/3GPP2 using either 3GPP or 3GPP2 technology to transmit and receive voice or data has an International Mobile station Equipment Identity (IMEI) to identify it. A URN namespace and an NSS for the IMEI are defined in [RFC7254]. For cases where the mobile equipment uses IMEI as an identity for dual-mode 3GPP/3GPP2 access, the IMEI URN as defined in [RFC7254] can be used to identify the mobile equipment.

However, single-mode 3GPP2 mobile equipment that supports only 3GPP2 access technology to transmit and receive voice or data has a hexadecimal MEID. Since there are fundamental differences between MEID and IMEI (i.e., in encoding, format, and the ownership), [RFC7254] cannot be employed to represent the hexadecimal MEID.

This document specifies a URN namespace for 3GPP2 and an NSS for the MEID as per the namespace registration requirement in [RFC8141]. The structure of an MEID is 15 hexadecimal digits long and is defined by 3GPP2 (see [S.R0048-A]) to uniquely identify each individual piece of mobile equipment (e.g., a handset or mobile phone). The 3GPP2 has a requirement to be able to use an MEID as a URN. This document fulfills that requirement. The Namespace Identifier (NID) ’3gpp2’ is for identities used in 3GPP2 networks. The MEID is managed by the 3GPP2, so this NID is managed by the 3GPP2. This specification defines only NSSs constructed from MEIDs under the ’3gpp2’ NID. These NSSs start with "meid:" in order to identify them as such. In the future, the 3GPP2 may specify other types of NSSs under the ’3gpp2’ NID.

The MEID is 15 hexadecimal digits long, includes a manufacturer code of 8 hexadecimal digits, and includes the serial number of 6 hexadecimal digits plus a hexadecimal digit as a check digit.

The manufacturer code identifies the mobile equipment manufacturer. A manufacturer can be assigned more than one manufacturer code. The serial number uniquely identifies each piece of mobile equipment within the manufacturer code. The check digit is used as assurance of integrity in error-prone operations, e.g., when used with certain types of readers during inventory-management operations. The check digit is not transmitted. Therefore, the first 14 of the 15 hexadecimal digits are used for defining the MEID as a URN.

The information here is meant to be a concise guide for those wishing to use the hexadecimal MEID as a URN. Nothing in this document should be construed to override [S.R0048-A], which defines the MEID.

## 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 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

## 3. Namespace Registration Template

A completed namespace registration follows.

Namespace Identifier: ’3gpp2’

Version: 1

Date: 2018-06-10

Registrant:
Standards Organization: Third Generation Partnership Project 2 (3GPP2)

Contact:

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Purpose: The ’3gpp2’ namespace is used to identify mobile equipment that uses technologies defined by the Third Generation Partnership Project 2 ((3GPP2); initially, such equipment is identified by a URN that embeds a Mobile Equipment Identity (MEID) that is 15 hexadecimal digits long and unique to each individual piece of mobile equipment (e.g., a handset or mobile phone).

Syntax: The identifier is expressed in American Standard Code for Information Interchange (ASCII) characters and has a hierarchical expression using the Augmented Backus-Naur Form (ABNF) defined in [RFC5234], as follows:

```
pp2-urn              = "urn:" pp2-NID ":" pp2-NSS
pp2-NID              = "3gpp2"
pp2-NSS              = meid-specifier / future-pp2-specifier
meid-specifier       = "meid:" meidval
future-pp2-specifier = future-specifier *[ ":" 1*( pchar / "/" )]
future-specifier     = 1*pp2-char
pp2-char             = ALPHA / DIGIT / "-" / "." / "_" /
                       pct-encoded
```

where ’pchar’ and ’pct-encoded’ are defined in [RFC3986]. An NSS for the MEID is defined under the ’3gpp2’ NID. The representation of the MEID is a specific number of hexadecimal digits, as

described in [S.R0048-A]. The formal definition of a URN with 'meid' NSS contains one meidval with the formal definition according to the following ABNF [RFC5234]:

```
meidval           = Manufacturer-Code "-" Serial-Number
Manufacturer-Code = 8HEX
Serial-Number     = 6HEX
HEX               = DIGIT / "A" / "B" / "C" / "D" / "E" / "F"
```

Assignment: The manufacturer code and serial number portions of the MEID are permanently stored in the mobile equipment, so they remain persistent as long as the mobile equipment exists. The process for manufacturer code and serial number assignment is documented in [SC.R4002-0] and the manufacturer code and serial number values once assigned are not reassigned to other pieces of mobile equipment.

Identifiers in the '3gpp2' namespace are defined and assigned by the 3GPP2 or an agency appointed by 3GPP2 after ensuring that the URNs to be assigned are unique. Procedures are in place to ensure that each MEID is uniquely assigned by the mobile equipment manufacturer so that it is guaranteed to uniquely identify that particular piece of mobile equipment.

Security and Privacy: See Section 6 of RFC 8464.

Interoperability: Although both the 3GPP2 Mobile Equipment Identity (MEID) and the 3GPP International Mobile station Equipment Identity (IMEI) are used to identify mobile equipment, they are separate identifiers and are not to be confused. Internet implementations will not generally possess MEID identifiers. The identifiers generated by such implementations will typically be URNs within namespaces other than '3gpp2', and may, depending on context, even be non-URN URIs. Implementations are advised to be ready to process URIs other than '3gpp2' namespace URNs, so as to aid in interoperability.

Resolution: No resolution is envisioned.

Documentation: Documentation can be found in the following specifications:

* "A URN Namespace for Device Identity and Mobile Equipment Identity (MEID)" [RFC8464].

* "3G Mobile Equipment Identifier (MEID) - Stage 1" [S.R0048-A].

* "GHA (Global Hexadecimal Administrator) Assignment Guidelines and Procedures for Mobile Equipment Identifier (MEID) and Short Form Expanded UIM Identifier (SF_EUIMID)" [SC.R4002-0].

Additional Information: Because the syntax of a 3GPP2 Mobile Equipment Identity (MEID) differs from that of a 3GPP International Mobile station Equipment Identity (IMEI), reuse of the URN specified in RFC 7254 is not possible.

Revision Information: N/A

# 4. Specification

## 4.1. MEID Parameters

Any future change to the format of the 'meid' NSS requires the use of the procedure for URN NSS changes (currently through the publication of a future Informational RFC approved by IETF consensus).

[RFC8465] specifies how the MEID URN can be used as an Instance ID as specified in [RFC5626]. Any change to the Instance ID will require an update to [RFC8465]. An example of 3GPP2 MEID URN is:

urn:3gpp2:meid:A04B0D56-02A7E3

## 4.2. MEID Format

### 4.2.1. Overview

The MEID format is 15 hexadecimal digits encoded in 8 octets as defined in [S.R0048-A]. The first 8 hexadecimal digits constitute the manufacturer code; the next 6 hexadecimal digits the serial number within the manufacturer code. The last hexadecimal digit is a check digit. For more details on the hexadecimal encoding, see Section 4.2.5.

### 4.2.2. Manufacturer Code

The manufacturer code is a value of 8 hexadecimal digits. The manufacturer code identifies the mobile equipment manufacturer. The manufacturer code is chosen from a range of values allocated to the mobile equipment manufacturer in order to uniquely identify the mobile equipment.

#### 4.2.3. Serial Number

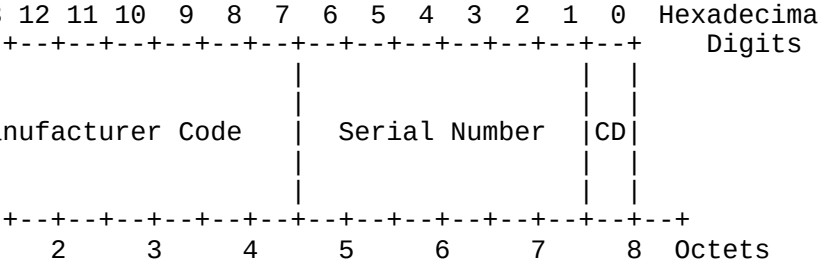
The serial number is a value of 6 hexadecimal digits. The serial number identifies equipment within the manufacturer code.

#### 4.2.4. Check Digit

This is a single hexadecimal digit (bits 1-4 of octet 8), and it is used as assurance of integrity in error-prone operations, e.g., when used with certain types of readers during inventory management operations. The check digit is not transmitted by the mobile equipment and is not used in the MEID URN.

#### 4.2.5. Hexadecimal Encoding

The MEID format is 15 hexadecimal digits encoded in 8 octets as defined in [S.R0048-A]. The following figure is an abstract representation of a hexadecimal-encoded MEID stored in memory (the actual storage format in memory is implementation specific). In this figure, the most significant digit of the manufacturer code is encoded in bits 1-4 of octet 1. Bits 5-8 of octet 8 are zero-padded, since bits 1-4 are only needed to encode the check digit. The most significant digit of the serial number is encoded in the bits 1-4 of octet 5. When MEID is included in a cellular signaling message, the check digit is omitted and the first 7 Octets in the following figure are only transmitted, [X.S0008-A].




## 5. IANA Considerations

In accordance with BCP 66 [RFC8141], IANA has registered the Formal URN namespace ’3gpp2’ in the "Uniform Resource Name (URN) Namespaces" registry, using the registration template presented in Section 3.

## 6. Security and Privacy Considerations

An MEID is usually printed outside of the box in which a mobile device ships. The MEID may also be printed under the battery on a mobile device; however, very few devices have removable batteries today. One can retrieve the MEID via either settings or by dialing *#06#. Anyone with brief physical access to the mobile device or its box can easily obtain the MEID. Therefore, MEIDs MUST NOT be used as security capabilities (identifiers whose mere possession grants access). Unfortunately, there are currently examples of some applications that are using the MEID for authorization. Also, some service providers' customer service departments have been known to use knowledge of the MEID as "proof" that the caller is the legitimate owner of the mobile device. Both of these are inappropriate uses of the MEID.

Since the MEID is permanently assigned to the mobile equipment and is not modified when the ownership of the mobile equipment changes (even upon a complete software reload of the mobile equipment), the MEID URN MUST NOT be used as a user identifier or user address by an application. Using the MEID to identify a user or as a user address could result in communications destined for a previous owner of a device being received by the new device owner or could allow the new device owner to access information or services owned by the previous device owner.

Additionally, since the MEID identifies the mobile equipment, it potentially could be used to identify and track users for the purposes of surveillance and call data mining if sent in the clear.

Since the MEID is personally identifiable information, uses of the MEID URN with IETF protocols require a specification and IETF expert review [RFC8126] in order to ensure that the privacy concerns are appropriately addressed. Protocols carrying the MEID URN SHOULD, at a minimum, use strongly hop-by-hop encrypted channels, and it is RECOMMENDED that end-to-end encryption be used.

# 7. References

## 7.1. Normative References

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[X.S0008-A]
3GPP2, "MAP Support for the Mobile Equipment Identity (MEID)", 3GPP2 TS X.S0008-A, Version 2.0, March 2014, <http://www.3gpp2.org/Public_html/Specs/X.S0008-A_v2.0_20140321.PDF>.

## 7.2. Informative References

[RFC7254] Montemurro, M., Ed., Allen, A., McDonald, D., and P. Gosden, "A Uniform Resource Name Namespace for the Global System for Mobile Communications Association (GSMA) and the International Mobile station Equipment Identity (IMEI)", RFC 7254, DOI 10.17487/RFC7254, May 2014, <https://www.rfc-editor.org/info/rfc7254>.

[RFC8465] Atarius, R., Ed., "Using the Mobile Equipment Identity (MEID) URN as an Instance ID", RFC 8465, DOI 10.17487/RFC8465, September 2018, <https://www.rfc-editor.org/info/rfc8465>.

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