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3GPP Release 13 Interworking
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Foreword

This Technical Report (TR) has been produced by ETSI Partnership Project oneM2M (oneM2M).

1 Scope

The present document is a study of interworking between oneM2M Architecture and 3GPP Rel-13 architecture for Service Capability Exposure as defined in the release 13 version of ETSI TS 123 682 [i.5]. The key objective and value is analyzed and described. The document also investigates the potential solution in oneM2M by evaluating the existing technical solutions.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] oneM2M Drafting Rules.

NOTE: Available at http://www.onem2m.org/images/files/oneM2M-Drafting-Rules.pdf.

[i.2] ETSI TS 118 102: "oneM2M; Requirements (oneM2M TS-0002)".

[i.3] ETSI TS 122 101: "Service aspects; Service principles (3GPP TS 22.101 Release 13)".

[i.4] ETSI TS 122 115: "Service aspects; Charging and billing (3GPP TS 22.115 Release 13)".

[i.5] ETSI TS 123 682: "Architecture enhancements to facilitate communications with packet data networks and applications (3GPP TS 23.682 Release 13)".

[i.6] OMA API Inventory.

NOTE: Available at http://technical.openmobilealliance.org/Technical/technical-information/oma-api-program.

[i.7] OMA Service Exposure Framework.

NOTE: Available at http://member.openmobilealliance.org/ftp/Public_documents/ARCH/ServiceExposure.

[i.8] OMA Exposing Network Capabilities to M2M.

NOTE: Available at http://member.openmobilealliance.org/ftp/Public_documents/ARCH/ENCap-M2M.

[i.9] ETSI TS 118 101: "oneM2M; Functional Architecture (oneM2M TS-0001)".

[i.10] ETSI TS 129 336: "Home Subscriber Server (HSS) diameter interfaces for interworking with packet data networks and applications (3GPP TS 29.336 Release 13)".

[i.11] ETSI TS 123 203: "Policy and charging control architecture (3GPP TS 23.203 Release 13)".

[i.12] ETSI TS 122 368: "Service requirements for Machine-Type Communications (MTC); Stage 1 (3GPP TS 22.368)".

[i.13] ETSI TS 126 346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs (3GPP TS 26.346)".

[i.14] ETSI TS 123 468: "Group Communication System Enablers for LTE (GCSE_LTE); Stage 2 (3GPP TS 23.468)".

[i.15] ETSI TS 123 246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description (3GPP TS 23.246)".

[i.16] ETSI TS 118 111: "oneM2M; Common Terminology (oneM2M TS-0011)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI TS 118 111 [i.16] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 118 111 [i.16] apply.

4 Conventions

The keywords "Shall", "Shall not", "May", "Need not", "Should", "Should not" in the present document are to be interpreted as described in the oneM2M Drafting Rules [i.1].

5 Introduction to 3GPP Service Capability Exposure

5.1 oneM2M Underlying Network related requirements

Following requirements are defined in ETSI TS 118 102 [i.2], but not implemented or partially implemented in release 1.

Most of these requirements except OSR-052 can be achieved through the 3GPP features addressed in the subsequent sections, with and without support by OMA API.

OSR-006: The oneM2M System should be able to reuse the services offered by Underlying Networks to M2M Applications and/or M2M Services by means of open access models (e.g. OMA, GSMA OneAPI framework).Examples of available services are:

- IP Multimedia communications.
- Messaging.
- Location.

- Charging and billing services, including sponsoring data flows.
- Device information and profiles, including configuring expected communication patterns.
- Configuration and management of devices.
- Triggering, monitoring of devices.
- Small data transmission.
- Group management and group messaging.
- Configuring QoS.
- Receiving Reports about the condition of the uderlying network.
- Partially implemented in Rel-1 (see note 1).

NOTE 1: Rel-1 covers: Location, Charging and billing services, Configuration and management of devices, Device information and profiles, Triggering.

OSR-045a: The oneM2M System should be able to receive and utilize information provided by the Underlying Network about when an M2M Device can be reached.

- Not implemented in Rel-1.

OSR-051: Depending on availability of suitable interfaces provided by the Underlying Network the oneM2M System should be able to request the Underlying Network to broadcast / multicast data to a group of M2M Devices in a specified area.

- Implemented in Rel-1 -> Not implemented in Rel-1. ??

OSR-052: The oneM2M System should be able to select an appropriate Underlying Network to broadcast or multicast data depending on the network's broadcast/multicast support and the connectivity supported by the targeted group of M2M Devices/Gateways.

- Not implemented in Rel-1.

OPR-004: When suitable interfaces are provided by the Underlying Network, the oneM2M System should have the ability to schedule traffic via the Underlying Network based on instructions received from the Underlying Network.

- Not implemented in Rel-1.

OPR-005: The oneM2M System should be able to exchange information with M2M Applications related to usage and traffic characteristics of M2M Devices or M2M Gateways by the M2M Application. This should include support for the 3GPP feature called: "Time controlled" (see note 2).

- Not implemented in Rel-1.

NOTE 2: "Time controlled" is equivalent to the MTC Features specified in clause 7.2 of ETSI TS 122 368 [i.12].

OPR-006: Depending on availability of suitable interfaces provided by the Underlying Network the oneM2M System should be able to provide information related to usage and traffic characteristics of M2M Devices or M2M Gateways to the Underlying Network.

- Not implemented in Rel-1.

5.2 3GPP Release 13 MTC features

In 3GPP Release 13, requirements for "Service exposure with 3rd party service providers" features are specified in clause 29 of ETSI TS 122 101 [i.3] and the "Charged party selection" feature is defined in sub-clause 5.1.3 of ETSI TS 122 115 [i.4].

3GPP Release 13 architecture supports these features and they can be used to implement the oneM2M requirements as described in the previous clause.

These 3GPP features are not only intended for M2M communication, but also for human usable applications such as smartphone applications.

3GPP intends to expose these additional features through the 3GPP Service Capability Exposure Function (SCEF) as described in the following clause.

5.3 3GPP architecture for Service Capability Exposure

The 3GPP architecture for the Service Capability Exposure Function (SCEF) is defined in ETSI TS 123 682 [i.5]. The specification includes two different architectures. One is for the "MTC Device triggering" feature and was specified in 3GPP release 11. The other one is for 3GPP Service exposure with 3rd party service providers features newly provided in Release 13 which is the focus of the present document. Refer to the following figure 5.3-1, taken from the release 13 version of ETSI TS 123 682 [i.5].

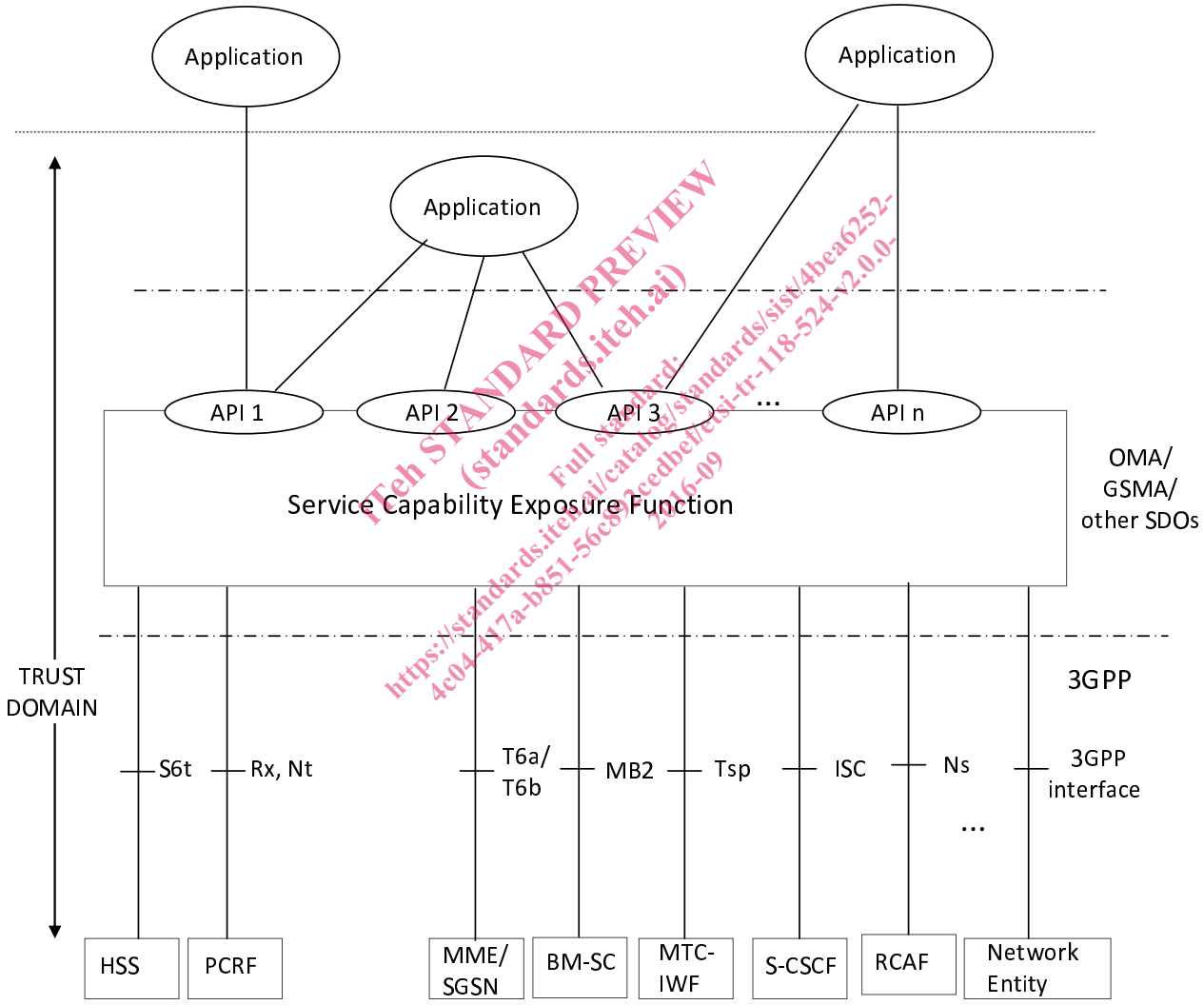

Figure 5.3-1: 3GPP Architecture for Service Capability Exposure

While 3GPP release 13 specifies the Service Capability Exposure Function (SCEF) as a 3GPP entity, residing in the trust domain of the 3GPP operator, 3GPP does not specify the APIs exposing these functions. Specification of these APIs is expected by external SDOs, e.g. OMA. As described in ETSI TS 123 682 [i.5]. the SCEF covers services such as the the ability to configure device communication patterns, the QoS of a data flow, sponsor a data flow, scheduling data transfers, monitor a device's state, optimizing a device's communication patterns for high latency applications, receive reports about the condition of the mobile core network, trigger devices, and send group messages via MBMS.

5.4 OMA API Program

5.4.1 Overview

The OMA API Program provides standardized interfaces to the service infrastructure residing within communication networks and on devices. Focused primarily between the service access layer and generic network capabilities, OMA API Program specifications allow operators and other service providers to expose device capabilities and network resources in an open and programmable way-to any developer community independent of the development platform. By deploying OMA APIs, fundamental capabilities such as SMS, MMS, Location Services, Payment and other core network assets are now exposed in a standardized way. Additional OMA APIs may be found in OMA API Inventory [i.6].

5.4.2 OMA work to be considered by oneM2M for 3GPP IWK

5.4.2.1 OMA Service Exposure Framework (ServiceExposure)

OMA ARC WG is working to define the Service Exposure Framework specification [i.7] which covers non-functional capabilities that a network operator or a service provider should consider when it exposes the service capabilities through the Network APIs. Such non-functional capabilities implemented in the intermediation layer may include Authentication and Authorization, Infrastructural Policy, Business Policy, Assurance and Accounting.

OMA Service Exposure Framework can be considered as an OMA specified SCEF which can be used by oneM2M s platforms.

5.4.2.2 OMA Exposing Network Capabilities to M2M (ENCap-M)

Recently, OMA ARC WG is developing new APIs for exposing network capabilities to M2M applications and/or M2M service platforms.

The OMA work item "Exposing Network Capabilities to M2M" [i.8] lists requirements on standard APIs derived from use cases in which third parties, such as oneM2M or any other can leverage network capabilities to enrich the services or to streamline the operation. It also includes a gap analysis to identify any missing Network APIs to address above requirements and use cases. This enables utilization of the latest evolution in cellular networks, e.g. 3GPP.

6 Reference architecture

Editor's Note: this clause describes the reference architecture of 3GPP interworking.

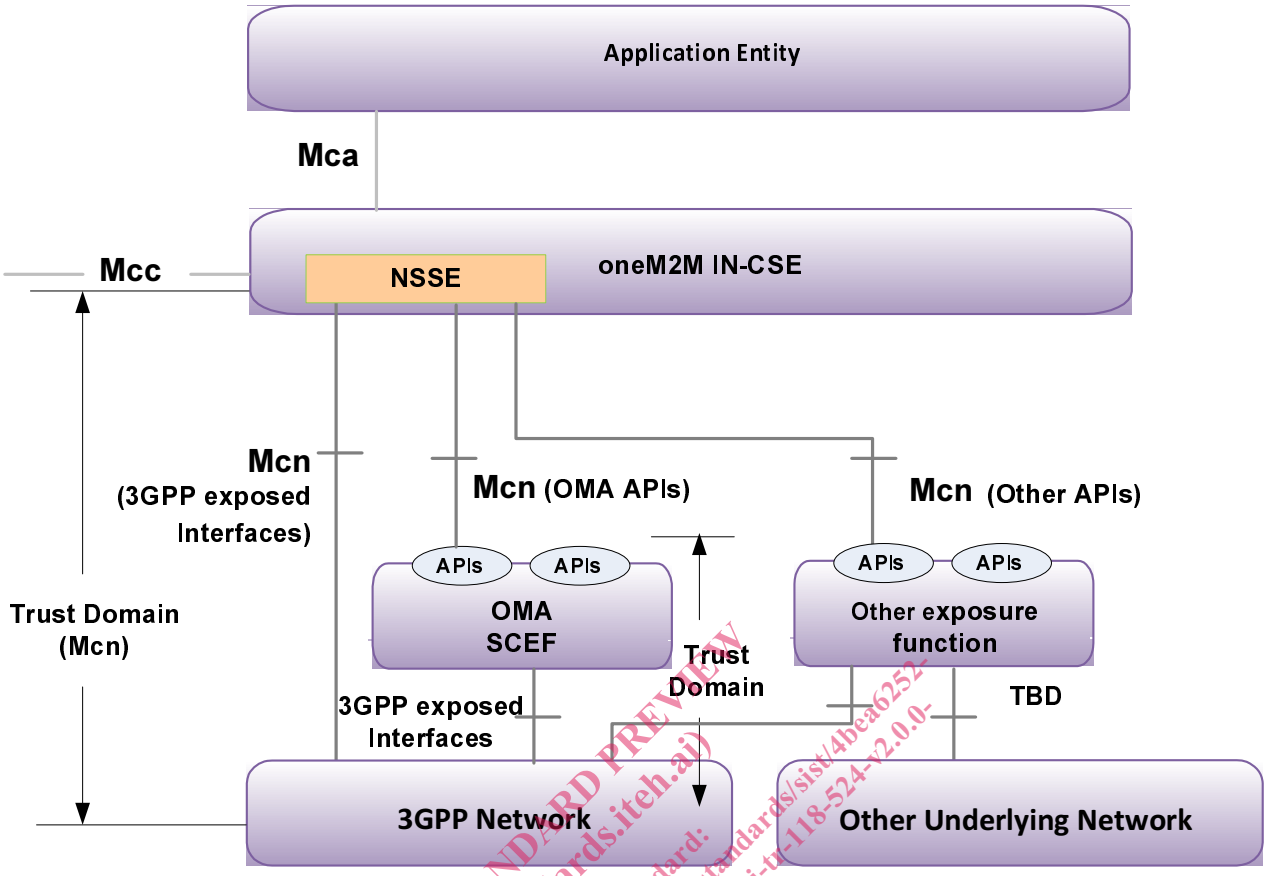

Figure 6-1: Interworking architecture

This architecture supports the following interworking modes:

- The NSSE invokes services of the underlying network directly via the reference points of the applicable nodes within the underlying network. This model is applicable to the case where the oneM2M service provider and the underlying network provider is the same or there is trust relation between both service providers if they are different.
- The NSSE exclusively invokes services of a 3GPP underlying network using OMA API.
- The NSSE invokes exclusively services of any underlying network using third party APIs.
- Any combination of the above, where some services are invoked using an API (OMA or third party depending on the underlying network) while other services are invoked directly with the underlying network using the applicable reference point.

The functionality supported by the NSSE is different depending on the interworking mode.

7 Potential impact for interworking with oneM2M

Editor's Note: this clause propose the enhancements based on architecture defined by oneM2M. What mechanisms can be reused and what need to be newly defined.

There are specific high level functions defined in ETSI TS 123 682 [i.5], clause 4.5, such as device triggering, information storage, group message delivery, monitoring, high latency communications, network status reporting, background data transfer, communication patterns parameters provisioning, session QoS setting up, chargeable party changing.

According to the end-to-end oneM2M functional architecture described in ETSI TS 118 101 [i.9], all Common Services Functions (CSFs) reside within CSE may support those functions defined by ETSI TS 123 682 [i.9] and no architecture functional changing.

The Network Service Exposure, Service Execution and Triggering (NSSE) CSF manages communications with the 3GPP MTC Release-13 Underlying Networks. The NSSE CSF may be deployed as SCEF using 3GPP defined interfaces (e.g. Rx, Tsp, etc.) bound to Mcn reference point. The NSSE CSF may also use OMA APIs or other APIs bound to Mcn reference point.

The Communication Management and Delivery Handling (CMDH) CSF may support those functions such as device triggering, group message delivery, monitoring, high latency communications, network status reporting, background data transfer, communication patterns parameters provisioning, session QoS setting up, chargeable party changing.

The Data Management and Repository (DMR) CSF may support those functions such as information storage, monitoring.

The Device Management (DMG) CSF may support monitoring function.

The Group Management (GMG) CSF may support group message delivery function.

The Location (LOC) CSF may support those functions such as monitoring, network status reporting.

Special authentication and authorization mechanisms for 3GPP Underlying Network such as IMSI, ACL, profile managements, policy control may be supported by the Security (SEC) CSF.

The Service Charging and Accounting (SCA) CSF may support those functions such as monitoring, chargeable party changing.

For supporting those functions, oneM2M system may add new attributes in existing resource types and changing existing service flowsor create new resource types and new service flows. For detail, please refer to section 8 potential solutions for interworking with oneM2M.

8 Potential solutions for interworking with oneM2M

8.1 Interworking Architecture with a 3GPP underlying network

8.1.1 Exclusive Support through 3GPP Reference Points

Figure 8.1.1-1 depicts this architectural model.

In this case 3GPP services capabilities are exclusively invoked via the 3GPP reference points for the applicable 3GPP node.

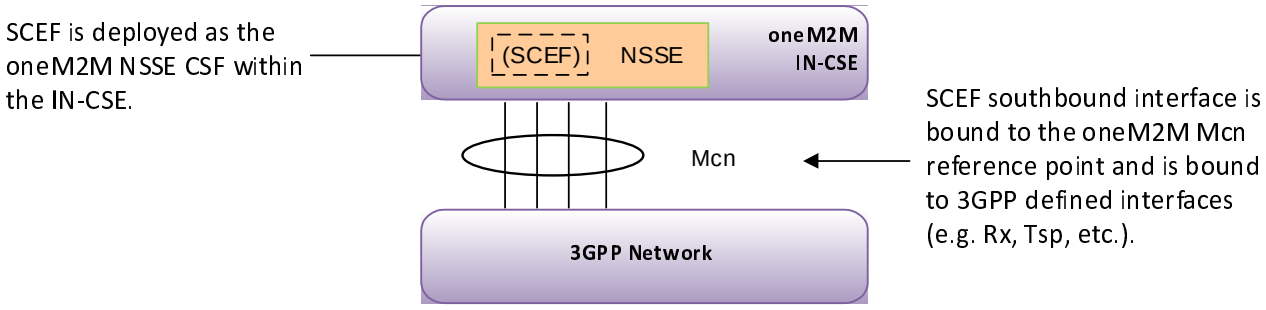

Figure 8.1.1-1: oneM2M interworking with a 3GPP underlying network via 3GPP Reference Points

8.1.2 Exclusive Support through OMA API

Figure 8.1.2-1 depicts this architectural model. In this case 3GPP services capabilities are exclusively invoked via the OMA API. Hence, the SCEF is fully implemented outside the oneM2M environment.

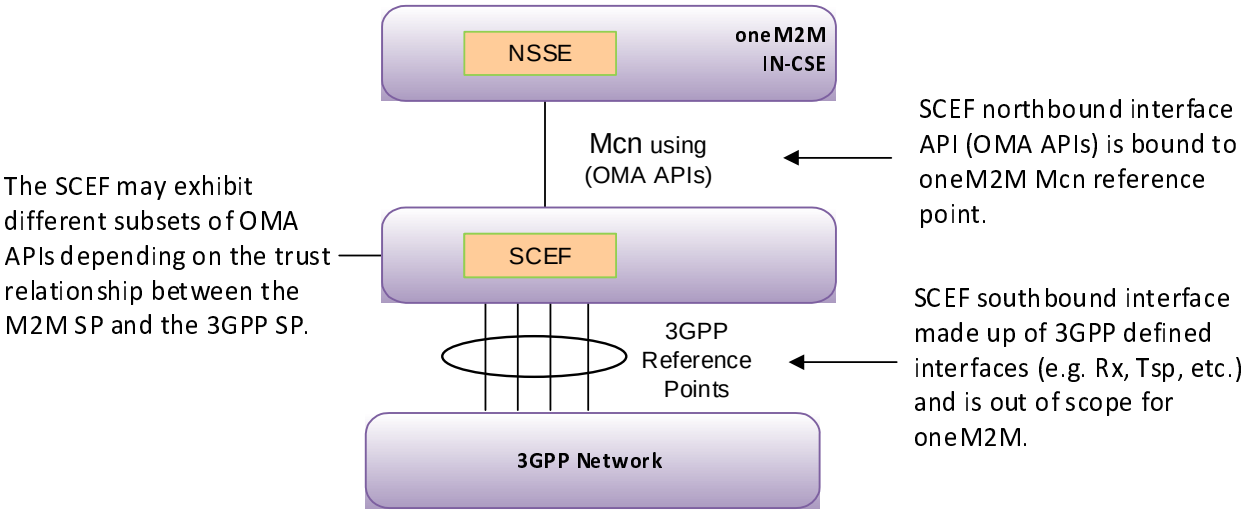

Figure 8.1.2-1: oneM2M interworking with a 3GPP underlying network via OMA API

8.1.3 Hybrid Mode

Figure 8.1.3-1 depicts this architectural model.

In this case 3GPP services capabilities are invoked on a per service basis which can include OMA API for some service, proprietary APIs for others and finally some services can be invoked directly using the 3GPP reference points.

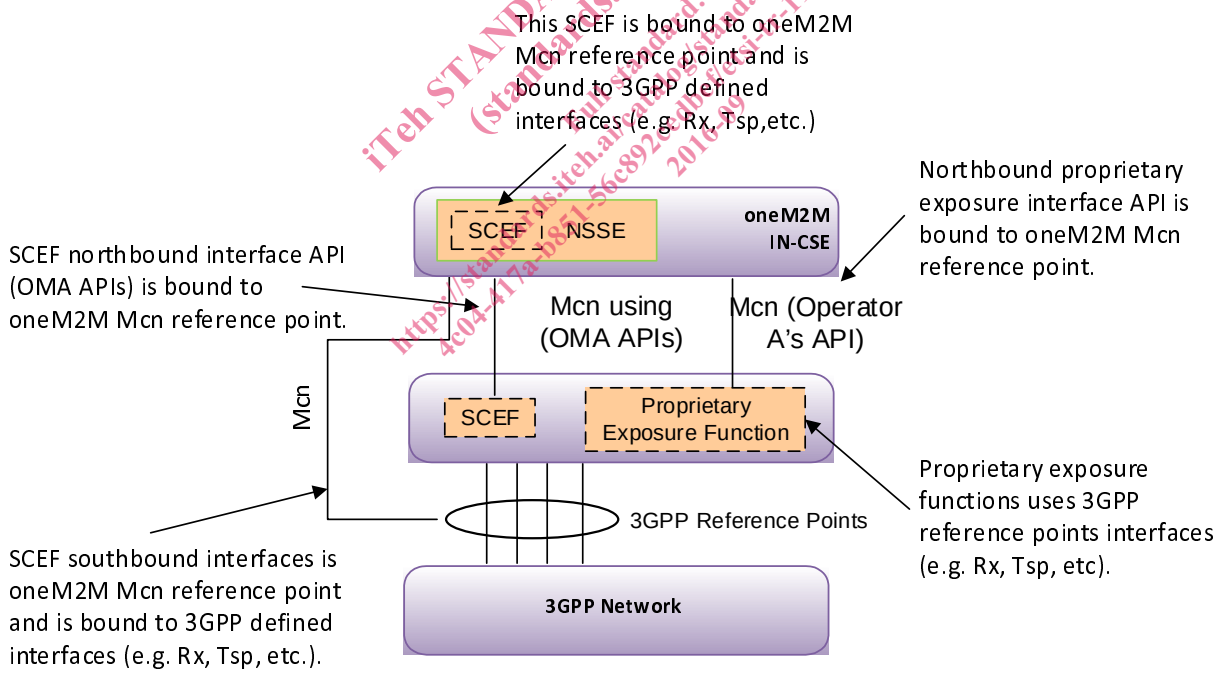

Figure 8.1.3-1: oneM2M interworking with a 3GPP underlying network in a hybrid mode

8.2 Configuration of Device Triggering Recall/Replace

8.2.1 Description

Device Triggering is the means by which a SCS sends information to the UE via the 3GPP network to trigger the UE to perform application specific actions that include initiating communication with the SCS for the indirect model or an AS in the network for the hybrid model. Device Triggering is required when an IP address for the UE is not available or reachable by the SCS/AS.