



Device Apps Network Efficiency

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1. Scope

This document defines the Technical Specification for the OMA Device Apps Network Efficiency (DANE) Enabler V1.0.

2. References

2.1 Normative References

- [3GPP TS 23.203] “Policy and charging control architecture”, 3rd Generation Partnership Project (3GPP),
[URL: http://www.3gpp.org/ftp/Specs/archive/23_series/23.203/](http://www.3gpp.org/ftp/Specs/archive/23_series/23.203/)
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[URL: http://www.3gpp.org/ftp/Specs/archive/23_series/23.207/](http://www.3gpp.org/ftp/Specs/archive/23_series/23.207/)
- [3GPP TS 29.213] “Policy and Charging Control signalling flows and QoS parameter mapping”, 3rd Generation Partnership Project (3GPP),
[URL: http://www.3gpp.org/ftp/Specs/archive/29_series/29.213/](http://www.3gpp.org/ftp/Specs/archive/29_series/29.213/)
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[URL:http://www.ietf.org/rfc/rfc2119.txt](http://www.ietf.org/rfc/rfc2119.txt)

2.2 Informative References

- [OMADICT] “Dictionary for OMA Specifications”, Version x.y, Open Mobile Alliance™,
OMA-ORG-Dictionary-Vx_y, [URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)

3. Terminology and Conventions

3.1 Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

3.2 Definitions

Device App	An application running in the device that uses device/network resources
Device Service Optimizer	An entity residing in the device, managing the interaction between Device Apps and device/network resources
PCRF	See [3GPP TS 23.203]

3.3 Abbreviations

3GPP	3rd Generation Partnership Project
API	Application Programming Interface
App	Application
DM	Device Management
DSO	Device Service Optimizer
E-UTRAN	Evolved Universal Terrestrial Radio Access Network
GBR	Guaranteed Bit Rate
IP	Internet Protocol
OMA	Open Mobile Alliance
PCRF	Policy and Charging Rules Function
QCI	QoS Class Identifier
QoE	Quality of Experience
QoS	Quality of Service
TCP	Transmission Control Protocol
URL	Uniform Resource Locator
Wi-Fi	Wireless Fidelity

4. Introduction

Smartphones and Tablets Devices have completely reshaped the nature of Mobile Services, having become the drivers of the industry growth: Devices and their ecosystem (on-line Stores) offer thousands of Services, in the form of Apps running on such popular Terminals. Device owners (and then the Mobile Customers) tend to install and use many Apps, but Apps are very often unable to take advantage of Network resources/capabilities Providers can offer.

Apps' behaviour, with respect to Wireless Network capabilities exploitation, is often not rational and left to chance, resulting in less Apps' quality, less Customers satisfaction and waste of wireless resources.

In this context, OMA DANE Enabler is a Device enabler in charge to optimize Device Apps QoE, exposing relevant Device APIs and collaborating with Wireless Networks Policy Managers.

Moreover, as many Apps are not optimized and are strongly impacting cellular networks in terms of signalling load, future releases of OMA DANE Enabler will deal with other aspects related to Network Efficiency and impacts of Apps on the signalisation - by identifying all Applications, classifying them in categories and executing mechanisms to reduce the impacts of these applications on the network, as well saving the battery life of the device.

4.1 Version 1.0

This document defines the technical requirements for the OMA Device Apps Network Efficiency (DANE) Enabler Version 1.0, i.e.:

- DANE-1 API (API to be exposed by the DANE “Device Service Optimizer”, i.e., a component running on Devices and offering the whole set of DANE functionalities; such API shall be consumed by authorized Device Apps);
- The DSO behaviour to respond accordingly upon reception of a request from Device Apps through specific APIs;
- How the DSO requires a dedicated bearer to the network, i.e., the DSO will interact with the 3GPP PCRF (through Rx interface or through a more generic QoS API exposed by the Mobile Network) in order to establish a dedicated bearer for the Device and in particular for a specific IP flow; in case of non-3GPP access, the interaction may be towards an alternative Policy Manager;
- DSO Measurements functionality and the Events Notification side of the API: when a Device App performs a successful registration to the DSO (through the Apps Registration and Events Notification API), the App also subscribes to “QoS level change” Event Notification;
- Policies to manage requests from Device Apps.

5. DSO behaviour

The DANE Enabler SHALL include a Device Service Optimizer (DSO).

The DSO SHALL be able to properly manage any registration request made towards DANE-1 interface by authorized Apps.

Specifically, the DSO SHALL be able to:

- forward to Device active Wi-Fi connection those IP flows having WiFi flag set to 1 in the relevant authorized App's request through DANE-1 interface (cfr. §6, DANE-1 interface definition)
- forward to Device active 3GPP connection (GPRS/3G/LTE) those IP flows having WiFi flag set to 0 in the relevant authorized App' request through DANE-1 interface

For those latter IP flows, the DSO SHALL associate a given IP flow to an already established dedicated bearer if and only if that bearer has a QoS level equal to or greater than the QoS level specified for the given IP flow in the relevant authorized App's request through DANE-1 interface

In the case there isn't, among the bearers already established between the Device and the 3GPP Network, a bearer with a QoS level equal to or greater than the QoS level specified for a certain IP flow in the relevant authorized App's request to DANE-1, then the DSO SHALL be able to trigger the establishment of a suitable dedicated bearer, sending, in the 3GPP case, a request to the PCRF Network element.

In general, in sending that request to PCRF, the DSO SHALL include the following parameters: Mobile User ID, one or more IP flow sockets and the desired QoS level for each IP flow.

In the case the PCRF does expose a Network API compliant with OMA-TS-REST_NetAPI_QoS-V1_0, the DSO SHALL be able to wrap and send a consistent request (i.e. compliant with what mandated in OMA-TS-REST_NetAPI_QoS-V1_0).

6. DANE-1 interface definition

DANE-1 interface SHALL be compliant with the following IDL ([OMGIDL]) definition:

```

/*
 * DANEService.idl
 * This is the idl definition of the DANE Service
 */

module DANEService {

    struct IPFlow {
        string ipsource;
        string ipdestination;
        short portsource;
        short portdestination;
        short qosLevel;
    };

    typedefsequence<IPFlow> ListIPFlow;

    interface IDANEServiceCallback {
        void result(inshort res);
    };

    interface IDANEService {
        boolean registrationApp(instring applicationID, inshort qos,
in ListIPFlow ipflow);
        short setQoSonPCRF (out IDANEServiceCallback callback,
inIPFlow ipflow);
    };

};

```

With respect to **struct** IPFlow records data types, the **short** qosLevel values SHALL be integers from “1” to “9”. Those values correspond and have the same meaning of the QCI values specified in [3GPP TS 23.203].

7. QoS Measurements and Events Notification

For each IP flow specified into authorized Apps' registration requests to DANE-1, the DSO SHALL be able to measure, at the IP level and at least each 10 seconds:

- the average one-way delay from the IP source to the IP destination
- the average jitter of the IP connection between source and destination
- the average packet loss rate of the IP connection between source and destination

The DSO SHALL be able, for each IP flow, to map those measured values into a consistent QoS level, according to [3GPP TS 23.203].

In the case that, for a certain IP flow, the actual calculated QoS level is lower than the QoS level specified for that IP flow in the relevant authorized App's request to DANE-1, then DSO SHALL notify the requesting App about the calculated QoS level, by means of DANE-1 `IDANEServiceCallback` interface (cfr. §6, DANE-1 interface definition).

How the notified App is going to use the QoS level info is considered out-of-scope of DANE V1.0 enabler.

8. Policy regulating DSO behaviour

The DSO SHALL be able to receive the policy which regulates DSO behaviour by a remote server operated by a Service Provider (e.g., an OMA-DM Server compliant, see [DMPRO] and [DMARCH]).

If the policy is obtained from an OMA-DM server, then the DSO behaviour policy SHALL be defined accordingly to operations of OMA-DM ([DMPRO], [DMARCH]).

The policy SHALL include a parameter specifying the max number of Device Apps allowed to simultaneously send a registration request to the DSO.

The policy SHALL include a parameter specifying the max number of registration requests to DSO allowed for a certain authorized Device App.

Device Apps SHALL be univocally identified by App IDs.

The policy MAY include the list of Device Apps authorized to send registration requests to the DSO.

The policy SHALL include a parameter specifying the max cumulative QoS level (i.e., the sum of requested IP flows' QoS levels) allowed for a certain App ID.

The policy SHALL include a parameter specifying the max cumulative QoS level allowed for a Device.

Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
n/a	n/a	No prior version

A.2 Draft/Candidate Version 1.0 History

Document Identifier	Date	Sections	Description
Draft Versions OMA-TS-DANE-V1_0	31 May 2013	All	First draft version baseline
	28 Jul 2014	All	Incorporated CRs: OMA-CD-DANE-2014-0001-CR_DANE_1_if OMA-CD-DANE-2014-0002R01-CR_DSO_behaviour OMA-CD-DANE-2014-0003R01-CR_QoS_and_events OMA-CD-DANE-2014-0004- CR_Scope__References__Definitions OMA-CD-DANE-2014-0005-CR_Introduction OMA-CD-DANE-2014-0006-CR_DANE_1_if_data_type OMA-CD-DANE-2014-0007-CR_Policies Editorial changes
	30 Jul 2014	2.1, A	Updated change history prior to consistency review. Editorial changes
Candidate Version OMA-TS-DANE-V1_0	13 Jan 2015	n/a	Status changed to Candidate by TP TP Ref # OMA-TP-2014-0280- INP_DANE_V1_0_ERP_and_ETR_for_Candidate_Approval

Appendix B. Static Conformance Requirements (Normative)

The notation used in this appendix is specified in [SCRRULES].

B.1 SCR for XYZ Client

Item	Function	Reference	Requirement
XYZ-C-001-M	Something mandatory	Section x.y	(XYZ-C-004-O OR XYZ-C-003-M) AND XYZ-C-002-O
XYZ-C-002-O	Something optional	Section x.y	
XYZ-C-003-M	Dependencies on ZYX	Section x.y	ZYX:MCF
XYZ-C-004-O	Dependencies on ZYX	Section x.y	ZYX:OCF

B.2 SCR for XYZ Server

Item	Function	Reference	Requirement
XYZ-S-001-M	Something mandatory	Section x.y	XYZ-S-004-O OR XYZ-S-002-O OR XYZ-S-003-M
XYZ-S-002-O	Something optional	Section x.y	
XYZ-S-003-M	Dependencies on ZYX	Section x.y	ZYX:MSF
XYZ-S-004-O	Dependencies on ZYX	Section x.y	ZYX:OSF