RESTful bindings for Parlay X Web Services – DeviceCapabilities

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Open Mobile Alliance

OMA-TS-ParlayREST_DeviceCapabilities-V1_0-20120724-A

Error! Reference source not found.

Contents

Error! Reference source not found.

Error! Reference source not found.

Error! Reference source not found.

Figures

Tables

Error! Reference source not found.

1. Scope

This specification defines a RESTful Device Capabilities API using an HTTP protocol binding, based on the similar API defined in [3GPP 29.199-18].

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2. References

2.1 Normative References

[3GPP 29.199-18]	3GPP Technical Specification, "Open Service Access (OSA); Parlay X Web Services; Part 18: Device capabilities and configuration (Release 8)", URL:http://www.3gpp.org/
[OMA_REST_TS_Common]	"Common definitions and specifications for OMA REST interfaces", Open Mobile Alliance™, OMA-TS_REST_Common-V1_0, URL: http://www.openmobilealliance.org/
[REST_TS_Common]	"RESTful bindings for Parlay X Web Services – Common", Open Mobile Alliance™, OMA-TS-ParlayREST_Common-V1_1, URL:http://www.openmobilealliance.org/
[RFC2119]	"Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, URL:http://www.ietf.org/rfc/rfc2119.txt
[RFC2616]	"Hypertext Transfer Protocol -- HTTP/1.1", R. Fielding et. al, January 1999, URL:http://www.ietf.org/rfc/rfc2616.txt
[RFC4627]	"The application/json Media Type for JavaScript Object Notation (JSON)", D. Crockford, July 2006, URL: http://www.ietf.org/rfc/rfc4627.txt
[SCRRULES]	"SCR Rules and Procedures", Open Mobile Alliance™, OMA-ORG-SCR_Rules_and_Procedures, URL:http://www.openmobilealliance.org/
[W3C-URLENC]	W3C HTML 2.0 Specification, form-urlencoded Media Type, URL: http://www.w3.org/MarkUp/html-spec/html-spec_8.html#SEC8.2.1
[XMLSchema1]	W3C Recommendation, XML Schema Part 1: Structures Second Edition, URL: http://www.w3.org/TR/xmlschema-1/
[XMLSchema2]	W3C Recommendation, XML Schema Part 2: Datatypes Second Edition, URL: http://www.w3.org/TR/xmlschema-2/

2.2 Informative References

[OMADICT]	"Dictionary for OMA Specifications", Version 2.8, Open Mobile Alliance™, OMA-ORG-Dictionary-V2_8, URL:http://www.openmobilealliance.org/
[REST_WP]	"White Paper on Guidelines for REST API specifications", Open Mobile Alliance™, OMA-WP-Guidelines_for_REST_API_specifications, URL:http://www.openmobilealliance.org/

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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

For the purpose of this TS, all definitions from the OMA Dictionary apply [OMA-DICT].

3.3 Abbreviations

API	Application Programming Interface
HTTP	HyperText Transfer Protocol
ID	Identifier
IMEI	International Mobile Equipment Identity
JSON	JavaScript Object Notation
MIME	Multipurpose Internet Mail Extensions
MSISDN	Mobile Subscriber ISDN Number
OMA	Open Mobile Alliance
REST	REpresentational State Transfer
SCR	Static Conformance Requirements
TS	Technical Specification
UAProfile	User Agent Profile
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
XML	eXtensible Markup Language
XSD	XML Schema Definition

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4. Introduction

The ParlayREST Technical Specification for Device Capabilities contains the HTTP protocol binding for the Parlay X Device Capabilities Web Services specification, using the REST architectural style. The specification provides resource definitions, the HTTP verbs applicable for each of these resources, and the element data structures, as well as support material including flow diagrams and examples using the various supported message body formats (i.e. XML, JSON, and form-urlencoding).

Generic guidelines for REST API specification development in OMA can be found in [REST_WP].

4.1 Version 1.0

Version 1.0 of DeviceCapabilities ParlayREST API specification supports the following operations:

- Get device capabilities

- Create a subscription for device capabilities change notifications (for a single device or a group of devices)

- Send a notification on device capabilities changes to a subscribed application

- Set device configuration (for a single device or a group of devices)

- Get available configurations for a given device model

- Get configuration history for a given device

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5. Device Capabilities API definition

This section is organized to support a comprehensive understanding of the Device Capabilities API design. It specifies the definition of all resources, definition of all data structures, and definitions of all operations permitted on the specified resources.

The Device Capabilities API will allow applications to get information about device capabilities and push device configuration to a device. Applications can subscribe to notifications of device capabilities changes for one or more devices. In addition, the Device Capabilities API provides applications with the ability to obtain the available device configurations for a given device model, as well as the configuration history for a given device.

Common data types, naming conventions, fault definitions and namespaces are defined in [REST_TS_Common] and [OMA_REST_TS_Common].

The remainder of this document is structured as follows:

Section 5 starts with a table listing all the resources (and their URL) used by this API, along with the data structure and the supported HTTP verbs (section 5.1). What follows are the data structures (section 5.2). A sample of typical use cases is included in section 5.3, described as high level flow diagrams.

The remaining subsections in section 5 contain the detailed specification for each of the resources. Each such subsection defines the resource, the request URI variables that are common for all HTTP commands, the possible HTTP response codes, and the supported HTTP verbs. For each supported HTTP verb, a description of the functionality is provided, along with an example of a request and an example of a response. For each unsupported HTTP verb, the returned HTTP error status is specified, as well as what should be returned in the Allow header.

All examples in section 5 use XML as the format for the message body. Form-urlencoded examples are provided in Appendix C, while JSON examples are provided in Appendix D. Appendix B provides the Static Conformance Requirements (SCR).

For requests and responses that have a body, the following applies: in the requests received, the server SHALL support JSON and XML encoding of the parameters in the body, and MAY support www-form-urlencoded parameters in the body. The Server SHALL return either JSON or XML encoded parameters in the response body, according to the result of the content type negotiation as specified in [OMA_REST_TS_Common]. In notifications to the Client, the server SHALL use either XML or JSON encoding, depending on which format the client has specified in the related subscription.

Finally, Appendix E lists the Parlay X equivalent method for each supported ParlayREST resource and method combination, where applicable.

Note: Throughout this document client and application can be used interchangeably.

5.1   Resources Summary

This section summarizes all the resources used by the Device Capabilities API.

The figure below visualizes the resource structure defined by this specification. Note that those nodes in the resource tree which have associated HTTP methods defined in this specification are depicted by solid boxes.

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//{serverRoot}/{apiVersion}

/devicecapabilities

/{equipmentId}

/capabilities

/subscriptions

/{subscriptionId}

/configuration

/available

/history
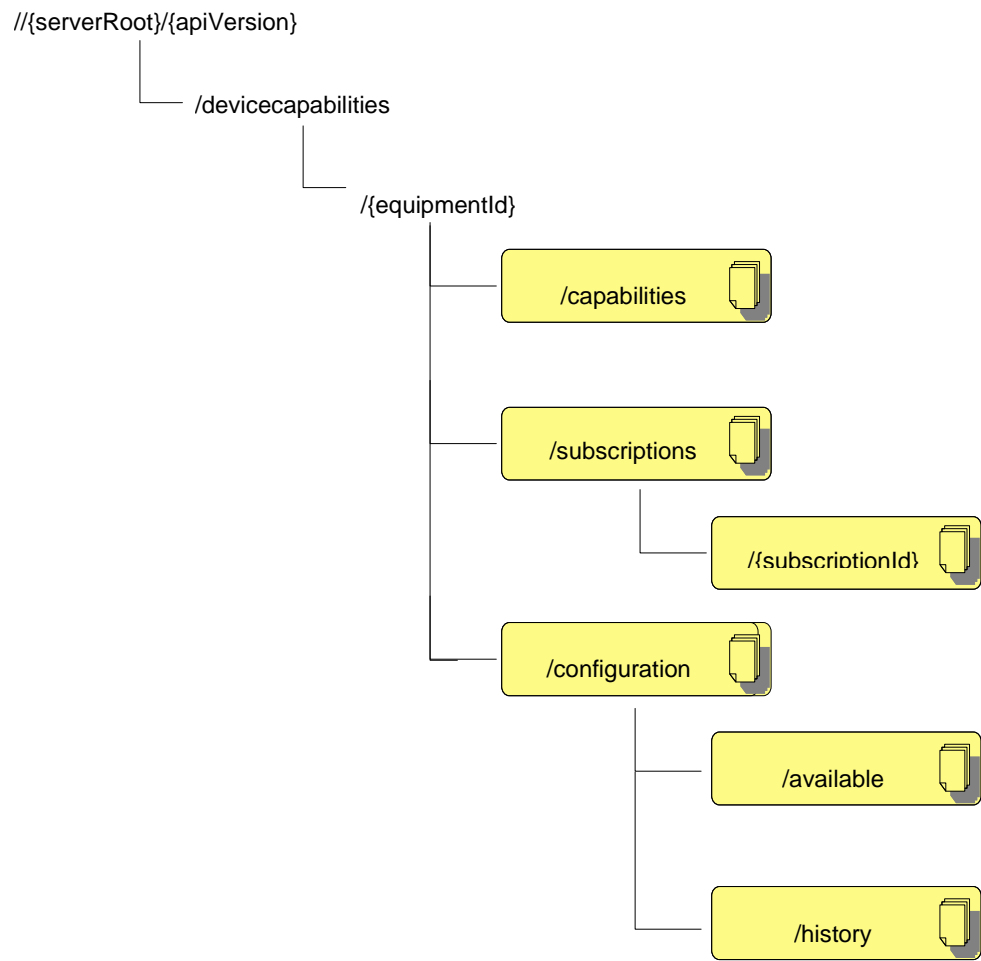
Figure 1 Resource structure defined by this specification

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The following tables give a detailed overview of the resources defined in this specification, the data type of their representation and the allowed HTTP methods.

Purpose: device capabilities

Resource	URL Base URL: http://{serverRoot}/{api Version}/devicecapabili ties	Data Structures	HTTP verbs			
			GET	PUT	POST	DELETE
Device capabilitie s	/{equipmentId}/capabili ties	DeviceCapabilities	retrieve capabilities of the identified device	no	no	no

Purpose: subscription management for device capabilities changes notifications

Resource	URL Base URL: http://{serverRoot}/{api Version}/devicecapabili ties	Data Structures	HTTP verbs			
			GET	PUT	POST	DELETE
Subscripti ons for device capabilitie s changes notificatio ns	/{equipmentId}/subscri ptions	DeviceCapabilitiesChange SubscriptionList common:ResourceReferen ce (optional alternative for POST response) DeviceCapabilitiesChange Subscription (used for POST)	retrieve the list of device capabilities changes subscription s for the identified device(s)	no	create a new device capabilitie s changes subscripti on for the identified device(s)	no
Individual subscripti on for device capabilitie s changes notificatio ns	/{equipmentId}/subscri ptions/{subscriptionId}	DeviceCapabilitiesChange Subscription	retrieve an individual device capabilities changes subscription for the identified device(s)	no	no	delete an individual device capabilitie s changes subscripti on for the identified device(s)

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Purpose: client resources for device capabilities configuration changes notifications

Resource	URL <specified by the client>	Data Structures	HTTP verbs			
			GET	PUT	POST	DELETE
Notification on device capabilities changes	<specified by the client when subscription is created or during provisioning process>	DeviceCapabilitiesNotification DeviceCapabilitiesCancellationNotification	no	no	send notifications to the application (changes, end of notifications, cancellation)	no

Purpose: configure a device, retrieve available configurations for a device and history of configurations.

Resource	URL Base URL: http://{serverRoot}/{apiVersion}/devicecapabilities	Data Structures	HTTP verbs			
			GET	PUT	POST	DELETE
Device configuration	/{equipmentId}/configuration	DeviceConfiguration	no	no	push a configuration to the identified device(s)	no
Available configurations	/{equipmentId}/configuration/available	DeviceConfigurationList	retrieve available configurations for the identified device	no	no	no
Configuration history	/{equipmentId}/configuration/history	DeviceConfigurationHistoryList	retrieve configuration history for the identified device.	no	no	no

5.2   DeviceCapabilities ParlayREST API Data Structures

The namespace for the Device Capabilities data types is:

> urn:oma:xml:rest:devicecapabilities:1

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The 'xsd' namespace is used in the present document to refer to the XML Schema data types defined in XML Schema [XMLSchema1, XMLSchema2]. The 'common' namespace is used in the present document to refer to the data types defined in [REST_TS_Common]. The use of the names 'xsd' and 'common' is not semantically significant.

5.2.1   Type: DeviceCapabilities

Device Capabilities for queries

Element	Type	Optional	Description
deviceId	xsd:string	No	A unique equipment identifier for the device (e.g. IMEI)
name	xsd:string	No	The name of the device/model.
resourceURL	xsd:anyURI	No	Self referring URL
link	common:Link[0..unbounded]	Yes	Provided by the server and points to other resources that are in relationship with the current resource (e.g. reference to UserAgentProfile)

A root element named deviceCapabilities of type DeviceCapabilities is allowed in request and/or response bodies.

5.2.2   Type: DeviceCapabilitiesNotification

Device capabilities for capabilities changes notification

Element	Type	Optional	Description
callbackData	xsd:string	Yes	CallbackData if passed by the application in the callbackReference element during the associated creation of the subscription operation.
changeNotificationEnd	xsd:boolean	Yes	Will be set to true if it is a final notification about status change. The default value is false.
deviceAddress	xsd:anyURI	Yes	If present - the address of the device. Not present if error applicable to the subscription in general (the notification goes to the application that subscribed for notifications about this device's configuration change).
deviceId	xsd:string	No	A unique equipment identifier for the device (e.g. IMEI)
link	common:Link[0..unbounded]	Yes	Provided by the server and points to other resources that are in relationship with the current resource (e.g. reference to notification subscription, device configuration, etc.).

A root element named deviceCapabilitiesNotification of type DeviceCapabilitiesNotification is allowed in request and/or response bodies.

5.2.3   Type: DeviceCapabilitiesCancellationNotification

Cancellation for device capabilities notification

Element	Type	Optional	Description
callbackData	xsd:string	Yes	CallbackData if passed by the application in the receiptRequest element during the associated startNotification operation.

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			See [REST_TS_Common], section 6.2.5
deviceAddress	xsd:anyURI	Yes	Address of terminal if the error applies to an individual terminal, or not specified if it applies to the whole notification
reason	common:ServiceError	No	Reason notification is being discontinued
link	common:Link [0..unbounded]	Yes	Link to other resources that are in relationship with the resource

A root element named deviceCapabilitiesCancellationNotification of type DeviceCapabilitiesCancellationNotification is allowed in request and/or response bodies.

5.2.4   Type: ConfigurationHistoryEntry

Device configuration history for query

Element	Type	Optional	Description
deviceConfiguration	DeviceConfiguration	No	A device configuration
timestamp	xsd:dateTime	No	The date/time when the configuration was sent to the device address.
link	common:Link[0..unbounded]	Yes	Provided by the server and points to other resources that are in relationship with the current resource

5.2.5   Type: DeviceConfigurationHistoryList

Device configurations history list for query

Element	Type	Optional	Description
configurationHistoryEntry	ConfigurationHistoryEntry [0..unbounded]	Yes	A list of configuration history elements
resourceURL	xsd:anyURI	No	Self referring URL

A root element named deviceConfigurationHistoryList of type DeviceConfigurationHistoryList is allowed in response bodies.

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5.2.6   Type: DeviceConfiguration

Device configuration for query or pushing

Element	Type	Optional	Description
configurationId	xsd:string	No	A unique identifier for the configuration, defined by the server.
name	xsd:string	No	The name of the configuration.
description	xsd:string	No	The description of the configuration
link	common:Link[0..unbounded]	Yes	Provided by the server and points to other resources that are in relationship with the current resource (e.g. references to configuration profile, etc.). A link to a ConfigurationProfileReference MUST be provided by the server, in a response to a GET request for available configurations from the application. In this release, there is no support for an application to provide to the server a link to a ConfigurationProfileReference, in a POST request to push a device configuration.

A root element named deviceConfiguration of type DeviceConfiguration is allowed in request and/or response bodies.

5.2.7   Type: DeviceConfigurationList

Available device configurations list for query

Element	Type	Optional	Description
deviceConfiguration	DeviceConfiguration[0..unbounded]	Yes	A list of available device configurations
resourceURL	xsd:anyURI	No	Self referring URL

A root element named deviceConfigurationList of type DeviceConfigurationList is allowed in request and/or response bodies.

5.2.8   Type: DeviceCapabilitiesChangeSubscriptionList

List of subscriptions to change notifications

Element	Type	Optional	Description
deviceCapabilitiesChangeSubscription	DeviceCapabilitiesChangeSubscription [0..unbounded]	Yes	It may contain an array of DeviceCapabilitiesChangeSubscription
resourceURL	xsd:anyURI	No	Self referring URL

A root element named deviceCapabilitiesChangeSubscriptionList of type DeviceCapabilitiesChangeSubscriptionList is allowed in request and/or response bodies.

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5.2.9   Type: DeviceCapabilitiesChangeSubscription

Subscription to change notifications

Element	Type	Optional	Description
timeCreated	xsd:dateTime	No	Timestamp for when the subscription has been created
callbackReference	common:CallbackReference	No	Client's Notification URL and OPTIONAL callbackData
clientCorrelator	xsd:string	Yes	A correlator that the client can use to tag this particular resource representation during a request to create a resource on the server. This field SHOULD be present. Note: this allows the client to recover from communication failures during resource creation and therefore avoids re-sending the message in such situations. In case the field is present, the server SHALL not alter its value, and SHALL provide it as part of the representation of this resource. In case the field is not present, the server SHALL NOT generate it.
resourceURL	xsd:anyURI	Yes	Self referring URL. SHALL NOT be included in POST requests, MUST be included in responses to any HTTP method that returns an entity body, and in PUT requests.
link	common:Link[0..unbounded]	Yes	Provided by the server and points to other resources that are in relationship with the current resource (e.g. related to DeviceConfiguration).

A root element named deviceCapabilitiesChangeSubscription of type DeviceCapabilitiesChangeSubscription is allowed in request and/or response bodies.

Note that the clientCorrelator is used for purposes of error recovery as specified in [REST_TS_Common], and internal client purposes. The server is NOT REQUIRED to use the clientCorrelator value in any form in the creation of the URL of the resource. The document [REST_TS_Common] provides a recommendation regarding the generation of the value of this field..

5.2.10   Values of the Link "rel" attribute

The "rel" attribute of the Link element is a free string set by the server implementation, to indicate a relationship between the current resource and an external resource. The following are possible strings (list is non-exhaustive, and can be extended):

- UserAgentProfileReference

- DeviceCapabilitiesChangeSubscription

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- DeviceCapabilities

- DeviceConfiguration

- ConfigurationProfileReference

These values indicate the kind of resource that the link points to. The value "UserAgentProfileReference" indicates that the accompanying Link href attribute refers to a document containing a device's User Agent Profile (e.g. http://.../deviceprofiles/N6230ir200.xml). The value "ConfigurationProfileReference" indicates that the accompanying Link href attribute refers to a document containing a device's configuration profile (e.g. http://.../deviceconfig/12345.xml").

5.3   Sequence Diagrams

5.3.1 Getting device capabilities information

This figure below shows a scenario for retrieving device capabilities information.

The resource:

- To get device capabilities for a single device, read the resource below with equipmentId identifying the targeted device

http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/capabilities
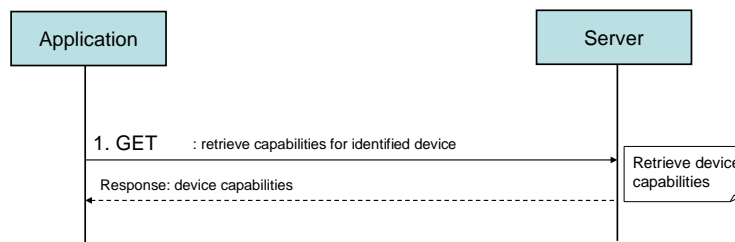
Figure 2 Getting device capabilities

Outline of flow:

1. An application requests the device capabilities for a device identified by equipmentId (e.g. device address) using GET and receives the device's capabilities information (including deviceId, model name, link to capabilities - e.g. UAProfile)

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5.3.2 Subscribing for and notifying on device(s) capabilities

This figure below shows a scenario to create and use a subscription for device capabilities changes notifications.

The resources:

- To start subscription to notifications about changes to device capabilities for identified device(s), create new resource under

    http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/subscriptions

- To delete an individual subscription, use the resource

    http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/subscriptions/{subscriptionId}
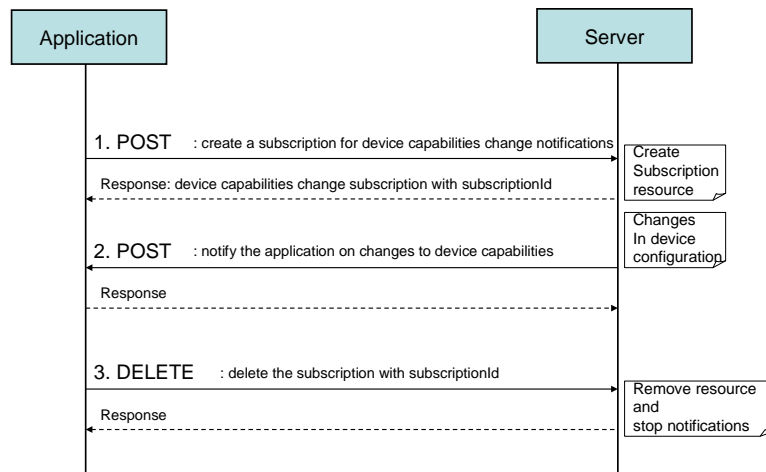
Figure 3 Subscribing for change notifications and handling notifications

1. An application creates a new notification subscription for changes in the device capabilities of the device(s) identified by {equipmentId} by using POST and receives the resulting resource URL containing the subscriptionId.

2. When the device capabilities for the identified device(s) change the server notifies the application using POST to the application supplied notifyURL.

3. An application deletes a subscription for changes in the device capabilities of the identified device(s) and stops notifications for the application by using DELETE to resource URL containing the subscriptionId.

5.3.3 Pushing a configuration to device(s)

This figure below shows a scenario for pushing a configuration to an identified device or group of devices.

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The resource:

- To push a configuration to identified device(s), POST the configuration to the resource below with equipmentId identifying the targeted device(s)

http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/configuration
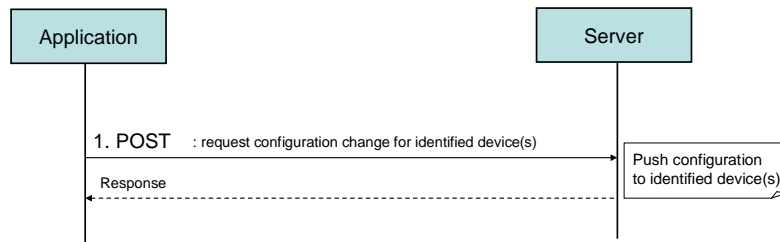
Figure 4 Push configuration to device(s)

Outline of flow:

1. An application requests that a new configuration is pushed to device(s) identified by equipmentId using POST.

5.3.4 Getting available configurations and history of configurations

This figure below shows a scenario to retrieve available configurations or history of configurations for device(s) identified by {equipmentId}.

The resources:

- To get available configurations for an identified device, read the resource below with equipmentId identifying the targeted device

http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/configuration/available

- To get configuration history for an identified device, read the resource below with equipmentId identifying the targeted device

http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/configuration/history

Error! Reference source not found.
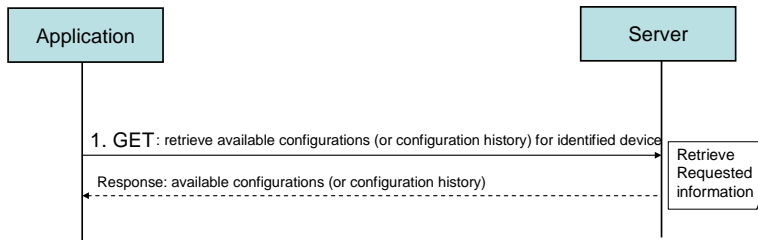
Figure 5 Getting available configurations or configuration history for targeted device

1. An application requests/receives available configurations or configurations history for a device identified by equipmentId using GET.

5.4   Resource: Device capabilities

The resource used is: **http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/capabilities**

The equipmentId must be percent-encoded according to [RFC3986].

The resource is intended to get the capabilities of an identified device. The device is identified by its equipmentId. In the current release, reading configuration for group of devices is not supported. If a group URI is provided, a service provider policy will determine whether the request can or cannot be supported. In case the request cannot be supported, a fault (POL0006) will be returned to the application.

The information returned is the device capabilities consisting of a unique ID for the device type, the name/model of the device and a link to the User Agent Profile XML file for the device.

5.4.1   Request URI variables

The following request URI variables are common for all HTTP commands:

Name	Description
serverRoot	server base url: hostname+port+base path. Example: http://example.com/exampleAPI
apiVersion	version of the ParlayREST API client wants to use (e.g. 1 for version 1)

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equipmentId	For single device use deviceAddress (e.g. device URI)

5.4.2 Response Codes

5.4.2.1 HTTP Response Codes

For HTTP response codes, see [OMA_REST_TS_Common].

5.4.2.2 Exception fault codes

For Policy Exception and Service Exception fault codes applicable to Device Capabilities, see [3GPP 29.199-18].

5.4.3 GET

This operation is used to retrieve capabilities of the identified device.

5.4.3.1 Example: Get device capabilities (Informative)

5.4.3.1.1 Request

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/capabilities HTTP/1.1
Accept: application/xml
Host: example.com
```

5.4.3.1.2 Response

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilities xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
    <deviceId>123456789012345</deviceId>
    <name>devname123</name>
    <resourceURL>http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/capabilities</resourceURL>
    <link rel="UserAgentProfileReference"
href="http://example.com/exampleconfigurations/exampledeviceprofiles/A1234xyz123.xml"/>
</dc:deviceCapabilities>
```

5.4.4 PUT

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET' field in the response as per section 14.7 of [RFC 2616].

5.4.5 POST

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET' field in the response as per section 14.7 of [RFC 2616].

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5.4.6   DELETE

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET' field in the response as per section 14.7 of [RFC 2616].

5.5   Resource: Subscriptions for device capabilities changes notifications

The resource used is: **http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/subscriptions**

The equipmentId must be percent-encoded according to [RFC3986].

The application sets a notification trigger for changes in the equipment identified (device or group of devices). In case a single device is targeted the application passes deviceAddress (e.g. the device URI) for the equipmentId. In case a group of devices is targeted the application passes a deviceGroupId (e.g. a group URI).

Note: in this release, a single subscription per client is supported. The reason for the resource structure is to provide for consistency with other APIs supporting subscriptions, and allow extensions in future releases for multiple subscriptions per client.

5.5.1   Request URI variables

The following request URI variables are common for all HTTP commands:

Name	Description
serverRoot	server base url: hostname+port+base path. Example: http://example.com/exampleAPI
apiVersion	version of the ParlayREST API client wants to use (e.g. 1 for version 1)
equipmentId	For single device use deviceAddress (e.g. device URI) For group of devices use deviceGroupId (e.g. group URI)

5.5.2   Response Codes

5.5.2.1   HTTP Response Codes

For HTTP response codes, see [OMA_REST_TS_Common].

5.5.2.2   Exception fault codes

For Policy Exception and Service Exception fault codes applicable to Device Capabilities, see [3GPP 29.199-18].

5.5.3   GET

This operation is used to retrieve the list of device capabilities changes subscriptions to notifications for the identified device(s).

In this release, a single subscription per application is supported.

5.5.3.1   Example: Get list of subscriptions   (Informative)

This example shows also an alternative way to indicate desired content type in response from the server, by using URL query parameter "?resFormat" which is described in [OMA_REST_TS_Common].

5.5.3.1.1   Request

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions?resFormat=XML HTTP/1.1
Host: example.com
```

5.5.3.1.2   Response

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesChangeSubscriptionList xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
   <deviceCapabilitiesChangeSubscription>
    <timeCreated>2010-03-21T13:23:21Z</timeCreated>
    <callbackReference>
        <notifyURL>http://application.example.com/notifications/CapabilitiesChangeNotification</notifyURL>
        <callbackData>12345</callbackData>
    </callbackReference>
    <clientCorrelator>54321</clientCorrelator>
    <resourceURL>http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/subscriptions/sub123</resourceURL>
  </deviceCapabilitiesChangeSubscription>
  <resourceURL>http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions</resourceURL>
</dc:deviceCapabilitiesChangeSubscriptionList>
```

5.5.4   PUT

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET, POST' field in the response as per section 14.7 of [RFC 2616].

5.5.5   POST

This operation is used to create a new device capabilities changes subscription to notifications for the identified device(s).

5.5.5.1   Example 1: Subscribe to device capabilities changes notifications for single device   (Informative)

This example also illustrates how to indicate the desired notification format.

5.5.5.1.1   Request

```
POST /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions HTTP/1.1
```

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```
Accept: application/xml
Host: example.com
Content-Type: application/xml
Content-Length: nnnn

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesChangeSubscription xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
    <timeCreated>2010-03-21T13:23:21Z</timeCreated>
    <callbackReference>
     <notifyURL>http://application.example.com/notifications/CapabilitiesChangeNotification</notifyURL>
     <callbackData>12345</callbackData>
     <notificationFormat>JSON</notificationFormat>
    </callbackReference>
    <clientCorrelator>54321</clientCorrelator>
</dc:deviceCapabilitiesChangeSubscription>
```

5.5.5.1.2   Response

```
HTTP/1.1 201 Created
Content-Type: application/xml
Location: http://example.com/exampleAPI/1/devicecapabilities/ tel%3A%2B1-555-555-0100/subscriptions/sub123

Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesChangeSubscription xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
    <timeCreated>2010-03-21T13:23:21Z</timeCreated>
    <callbackReference>
        <notifyURL>http://application.example.com/notifications/CapabilitiesChangeNotification</notifyURL>
        <callbackData>12345</callbackData>
        <notificationFormat>JSON</notificationFormat>
    </callbackReference>
    <clientCorrelator>54321</clientCorrelator>
    <resourceURL> http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/subscriptions/sub123</resourceURL>
</dc:deviceCapabilitiesChangeSubscription>
```

5.5.5.2   Example 2: Subscribe to device capabilities changes notifications for group of devices   (Informative)

5.5.5.2.1   Request

```
POST /exampleAPI/1/devicecapabilities/GRP1-555-555-0100/subscriptions HTTP/1.1
Accept: application/xml
Host: example.com
Content-Type: application/xml
```

Error! Reference source not found.

```
Content-Length: nnnn

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesChangeSubscription xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
    <timeCreated>2010-03-21T13:23:21Z</timeCreated>
    <callbackReference>
      <notifyURL>http://application.example.com/notifications/CapabilitiesChangeNotification</notifyURL>
      <callbackData>12345</callbackData>
    </callbackReference>
    <clientCorrelator>54321</clientCorrelator>
</dc:deviceCapabilitiesChangeSubscription>
```

5.5.5.2.2   Response

```
HTTP/1.1 201 Created
Content-Type: application/xml
Location: http://example.com/exampleAPI/1/devicecapabilities/GRP1-555-555-0100/subscriptions/sub123
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesChangeSubscription xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
    <timeCreated>2010-03-21T13:23:21Z</timeCreated>
    <callbackReference>
        <notifyURL>http://application.example.com/notifications/CapabilitiesChangeNotification</notifyURL>
        <callbackData>12345</callbackData>
    </callbackReference>
    <clientCorrelator>54321</clientCorrelator>
    <resourceURL> http://example.com/exampleAPI/1/devicecapabilities/GRP1-555-555-
0100/subscriptions/sub123</resourceURL>
</dc:deviceCapabilitiesChangeSubscription>
```

5.5.5.3   Example 3: Subscribe to device capabilities changes notifications for single device (with resource reference instead of full resource representation in the response body)   (Informative)

5.5.5.3.1   Request

```
POST /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions HTTP/1.1
Accept: application/xml
Host: example.com:80

Content-Type: application/xml
Content-Length: nnnn

<?xml version="1.0" encoding="UTF-8"?>
```

Error! Reference source not found.

```
<dc:deviceCapabilitiesChangeSubscription xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
    <timeCreated>2010-03-21T13:23:21Z</timeCreated>
    <callbackReference>
     <notifyURL>http://application.example.com/notifications/CapabilitiesChangeNotification</notifyURL>
     <callbackData>12345</callbackData>
    </callbackReference>
    <clientCorrelator>54321</clientCorrelator>
</dc:deviceCapabilitiesChangeSubscription>
```

5.5.5.3.2 Response

```
HTTP/1.1 201 Created
Content-Type: application/xml
Location: http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

<?xml version="1.0" encoding="UTF-8"?>
<common:resourceReference xmlns:common="urn:oma:xml:rest:common:1">
  <resourceURL>http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123</resourceURL>
</common:resourceReference>
```

5.5.6 DELETE

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET, POST' field in the response as per section 14.7 of [RFC 2616].

5.6 Resource: Individual subscription for device capabilities changes notifications

The resource used is: **http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/subscriptions/{subscriptionId}**

The equipmentId must be percent-encoded according to [RFC3986].

The application can retrieve or delete a notification trigger for changes in the equipment identified (device or group of devices). In case a single device is targeted the application passes deviceAddress (e.g. the device URI) for the equipmentId. In case a group of devices is targeted the application passes a deviceGroupId (e.g. a group URI).

In this release, a single subscription per application is supported. The reason for the resource structure supporting a list of subscriptions is to provide consistency with other APIs supporting subscriptions, and allow extensions in future releases for multiple subscriptions per application.

5.6.1 Request URI variables

The following request URI variables are common for all HTTP commands:

Name	Description

Error! Reference source not found.

serverRoot	server base url: hostname+port+base path. Example: http://example.com/exampleAPI
apiVersion	version of the ParlayREST API client wants to use (e.g. 1 for version 1)
equipmentId	For single device use deviceAddress (e.g. device URI) For group of devices use deviceGroupId (e.g. group URI)
subscriptionId	Identifier of a subscription.

5.6.2   Response Codes

5.6.2.1   HTTP Response Codes

For HTTP response codes, see [OMA_REST_TS_Common].

5.6.2.2   Exception fault codes

For Policy Exception and Service Exception fault codes applicable to Device Capabilities, see [3GPP 29.199-18].

5.6.3   GET

This operation is used to retrieve an individual device capabilities changes subscription to notifications for a given device or group of devices.

5.6.3.1   Example: Get subscription   (Informative)

5.6.3.1.1   Request

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123 HTTP/1.1
Accept: application/xml
Host: example.com
```

5.6.3.1.2   Response

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesChangeSubscription xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
  <timeCreated>2010-03-21T13:23:21Z</timeCreated>
  <callbackReference>
    <notifyURL>http://application.example.com/notifications/CapabilitiesChangeNotification</notifyURL>
    <callbackData>12345</callbackData>
  </callbackReference>
  <clientCorrelator>54321</clientCorrelator>
```

Error! Reference source not found.

```
<resourceURL>http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123</resourceURL>
</dc:deviceCapabilitiesChangeSubscription>
```

5.6.4   PUT

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET, DELETE' field in the response as per section 14.7 of [RFC 2616].

5.6.5   POST

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET, DELETE' field in the response as per section 14.7 of [RFC 2616].

5.6.6   DELETE

This operation is used to delete an individual device capabilities changes subscription to notifications for a given device or group of devices.

5.6.6.1   Example: Delete subscription   (Informative)

5.6.6.1.1   Request

```
DELETE /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscription/sub123 HTTP/1.1
Accept: application/xml
Host: example.com
```

5.6.6.1.2   Response

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

5.7   Resource: Notification on device capabilities changes

This resource is a client provided URL when subscription for device capabilities changes is established. ParlayREST does not make any assumption about the structure of this URL.

5.7.1   Request URI variables

Client provided.

5.7.2   Response Codes

5.7.2.1   HTTP Response Codes

For HTTP response codes, see [OMA_REST_TS_Common].

Error! Reference source not found.

5.7.3   GET

Method not allowed by the resource. The returned HTTP error status is 405. The client should also include the 'Allow: POST' field in the response as per section 14.7 of [RFC 2616].

5.7.4   PUT

Method not allowed by the resource. The returned HTTP error status is 405. The client should also include the 'Allow: POST' field in the response as per section 14.7 of [RFC 2616].

5.7.5   POST

This operation is used by the server to send notifications to the application. There are three types of notifications:

1) normal change – a new deviceId is delivered as part of the structure

2) end of notifications - the notifications have ended for this subscription. This message will be delivered when the duration for notifications has been completed. This message will not be delivered in the case of an error ending the notifications or deliberate ending of the notification by client.

3) error – indicates cancelling the notifications with a reason for cancellation

5.7.5.1   Example 1: Device capabilities changes notification   (Informative)

5.7.5.1.1   Request

```
POST /notifications/CapabilityChangeNotification HTTP/1.1
Content-Type: application/xml
Content-Length: nnnn
Host: application:example.com

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesNotification xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
 <callbackData>12345</callbackData>
 <changeNotificationEnd>false</changeNotificationEnd>
 <deviceAddress>tel:+1-555-555-0100</deviceAddress>
 <deviceId>123456789012345</deviceId>
 <link rel="DeviceCapabilitiesChangeSubscription" href= "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-
555-0100/subscriptions/sub123"/>
 <link rel="DeviceCapabilities" href="http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/capabilities"/>
 <link rel="DeviceConfiguration" href="http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/configuration"/>
</dc:deviceCapabilitiesNotification>
```

5.7.5.1.2   Response

```
HTTP/1.1 204 No Content
```

Error! Reference source not found.

Date: Thu, 04 Jun 2010 02:52:00 GMT

5.7.5.2 Example 2: End of changes notification (Informative)

5.7.5.2.1 Request

```
POST /notifications/CapabilityChangeNotification HTTP/1.1
Content-Type: application/xml
Content-Length: nnnn
Host: application:example.com

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesNotification xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
  <callbackData>12345</callbackData>
  <changeNotificationEnd>true</changeNotificationEnd>
  <deviceAddress>tel:+1-555-555-0100</deviceAddress>
  <deviceId>123456789012345</deviceId>
  <link rel="DeviceCapabilitiesChangeSubscription" href= "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-
555-0100/subscriptions/sub123"/>
  <link rel="DeviceCapabilities" href="http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/capabilities"/>
  <link rel="DeviceConfiguration" href="http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/configuration"/>
</dc:deviceCapabilitiesNotification>
```

5.7.5.2.2 Response

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

5.7.5.3 Example 3: Error notification (notification cancellation) (Informative)

5.7.5.3.1 Request

```
POST /notifications/StatusNotification HTTP/1.1
Content-Type: application/xml
Content-Length: nnnn
Host: application:example.com

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesCancellationNotification xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
```

Error! Reference source not found.

```
<callbackData>12345</callbackData>
<deviceAddress>tel:+1-555-555-0100</deviceAddress>
<reason>
   <messageId>SVC0001</messageId>
   <text>A service error occurred. %1 %2</text>
   <variables>Status information is not available for</variables>
   <variables>tel:+1-555-555-0100</variables>
</reason>
 <link rel="DeviceCapabilitiesChangeSubscription" href= "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-
555-0100/subscriptions/sub123"/>
 <link rel="DeviceCapabilities" href="http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/capabilities"/>
 <link rel="DeviceConfiguration" href="http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/configuration"/>
</dc:deviceCapabilitiesCancellationNotification>
```

5.7.5.3.2 Response

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

5.7.6 DELETE

Method not allowed by the resource. The returned HTTP error status is 405. The client should also include the 'Allow: POST' field in the response as per section 14.7 of [RFC 2616].

5.8 Resource: Device configuration

The resource used is: **http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/configuration**

The equipmentId must be percent-encoded according to [RFC3986].

The resource supports pushing a configuration to a device or a group of devices.

5.8.1 Request URI variables

The following request URI variables are common for all HTTP commands:

Name	Description
serverRoot	server base url: hostname+port+base path. Example: http://example.com/exampleAPI
apiVersion	version of the ParlayREST API client wants to use (e.g. 1 for version 1)
equipmentId	For single device use deviceAddress (e.g. device URI)

Error! Reference source not found.

	For group of devices use deviceGroupId (e.g. group URI)

5.8.2   Response Codes

5.8.2.1   HTTP Response Codes

For HTTP response codes, see [OMA_REST_TS_Common].

5.8.2.2   Exception fault codes

For Policy Exception and Service Exception fault codes applicable to Device Capabilities, see [3GPP 29.199-18].

5.8.3   GET

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: POST' field in the response as per section 14.7 of [RFC 2616].

5.8.4   PUT

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: POST' field in the response as per section 14.7 of [RFC 2616].

5.8.5   POST

This operation is used to push a configuration to a device or a group of devices. This operation results in a one-time push of a device configuration, and the resource is no longer accessible by the application for other operations.

5.8.5.1   Example 1: Push configuration to single device   (Informative)

5.8.5.1.1   Request

```
POST /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration HTTP/1.1
Host: example.com
Content-Type: application/xml
Content-Length: nnnn

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceConfiguration xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
 <configurationId>config12345</configurationId>
 <name>configname12345</name>
 <description>configdescription12345</description>
</dc:deviceConfiguration>
```

5.8.5.1.2   Response

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

Error! Reference source not found.

5.8.5.2 Example 2: Push configuration to group of devices (Informative)

5.8.5.2.1 Request

```
POST /exampleAPI/1/devicecapabilities/GRP1-555-555-0100/configuration HTTP/1.1
Host: example.com
Content-Type: application/xml
Content-Length: nnnn

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceConfiguration xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
    <configurationId>config12345</configurationId>
    <name>configname12345</name>
    <description>configdescription12345</description>
</dc:deviceConfiguration>
```

5.8.5.2.2 Response

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

5.8.6 DELETE

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: POST' field in the response as per section 14.7 of [RFC 2616].

5.9 Resource: Available configurations

The resource used is: **http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/configuration/available**

The equipmentId must be percent-encoded according to [RFC3986].

The resource is used to retrieve configurations available for an identified device. In the current release, reading configurations available for a group of devices is not supported. If a group URI is provided, a service provider policy will determine whether the request can or cannot be supported. In case the request cannot be supported, a fault (POL0006) will be returned to the application.

The configurations have to be made available in advance by the gateway operator.

5.9.1 Request URI variables

The following request URI variables are common for all HTTP commands:

Name	Description
serverRoot	server base url: hostname+port+base path. Example: http://example.com/exampleAPI

Error! Reference source not found.

apiVersion	version of the ParlayREST API client wants to use (e.g. 1 for version 1)
equipmentId	For single device use deviceAddress (e.g. device URI)

5.9.2 Response Codes

5.9.2.1 HTTP Response Codes

For HTTP response codes, see [OMA_REST_TS_Common].

5.9.2.2 Exception fault codes

For Policy Exception and Service Exception fault codes applicable to Device Capabilities, see [3GPP 29.199-18].

5.9.3 GET

This operation is used to retrieve available configurations for the identified device.

5.9.3.1 Example: Retrieve available device configurations   (Informative)

5.9.3.1.1 Request

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration/available HTTP/1.1
Accept: application/xml
Host: example.com
```

5.9.3.1.2 Response

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

<?xml version="1.0" encoding="UTF-8"?>
 <dc:deviceConfigurationList xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
    <deviceConfiguration>
     <configurationId>config12345</configurationId>
     <name>configname12345</name>
     <description>configdescription12345</description>
     <link rel="ConfigurationProfileReference" href="http://example.com/exampleconfigurations/exampledeviceconfig/12345.xml"/>
    </deviceConfiguration>
    <deviceConfiguration>
     <configurationId>config12346</configurationId>
     <name>configname12346</name>
     <description>configdescription12346</description>
     <link rel="ConfigurationProfileReference" href="http://example.com/exampleconfigurations/exampledeviceconfig/12346.xml"/>
```

```
     </deviceConfiguration>
     <deviceConfiguration>
      <configurationId>config12347</configurationId>
      <name>configname12347</name>
      <description>configdescription12347</description>
      <link rel="ConfigurationProfileReference" href="http://example.com/exampleconfigurations/exampledeviceconfig/12347.xml"/>
     </deviceConfiguration>
    <resourceURL>http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/configuration/available</resourceURL>
  </dc:deviceConfigurationList>
```

5.9.4   PUT

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET' field in the response as per section 14.7 of [RFC 2616].

5.9.5   POST

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET' field in the response as per section 14.7 of [RFC 2616].

5.9.6   DELETE

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET' field in the response as per section 14.7 of [RFC 2616].

5.10   Resource: Configuration history

The resource used is: **http://{serverRoot}/{apiVersion}/devicecapabilities/{equipmentId}/configuration/history**

The equipmentId must be percent-encoded according to [RFC3986].

The resource is used to retrieve configurations previously pushed to an identified device. In the current release, reading configurations previously pushed to a group of devices is not supported. If a group URI is provided, a service provider policy will determine whether the request can or cannot be supported. In case the request cannot be supported, a fault (POL0006) will be returned to the application.

5.10.1   Request URI variables

The following request URI variables are common for all HTTP commands:

Name	Description
serverRoot	server base url: hostname+port+base path. Example: http://example.com/exampleAPI
apiVersion	version of the ParlayREST API client wants to use (e.g. 1 for version 1)

Error! Reference source not found.

equipmentId	For single device use deviceAddress (e.g. device URI)

5.10.2 Response Codes

5.10.2.1 HTTP Response Codes

For HTTP response codes, see [OMA_REST_TS_Common].

5.10.2.2 Exception fault codes

For Policy Exception and Service Exception fault codes applicable to Device Capabilities, see [3GPP 29.199-18].

5.10.3 GET

This operation is used to retrieve configuration history for the identified device.

5.10.3.1 Example: Retrieve configuration history (Informative)

5.10.3.1.1 Request

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration/history HTTP/1.1
Accept: application/xml
Host: example.com
```

5.10.3.1.2 Response

```
HTTP/1.1 200 OK
Content-Type: application/xml
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

<?xml version="1.0" encoding="UTF-8"?>
    <dc:deviceConfigurationHistoryList xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
     <configurationHistoryEntry>
      <deviceConfiguration>
       <configurationId>config12345</configurationId>
       <name>configname12345</name>
       <description>configdescription12345</description>
       <link rel="ConfigurationProfileReference"
href="http://example.com/exampleconfigurations/exampledeviceconfig/12345.xml"/>
      </deviceConfiguration>
     <timestamp>2009-11-19T12:00:00</timestamp>
    </configurationHistoryEntry>
    <configurationHistoryEntry>
     <deviceConfiguration>
      <configurationId>config12347</configurationId>
```

Error! Reference source not found.

```
        <name>configname12347</name>
        <description>configdescription12347</description>
        <link rel="ConfigurationProfileReference"
href="http://example.com/exampleconfigurations/exampledeviceconfig/12347.xml"/>
      </deviceConfiguration>
      <timestamp>2009-10-19T12:00:00</timestamp>
   </configurationHistoryEntry>
   <resourceURL>http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-
0100/configuration/history</resourceURL>
  </dc:deviceConfigurationHistoryList>
```

5.10.4   PUT

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET' field in the response as per section 14.7 of [RFC 2616].

5.10.5   POST

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET' field in the response as per section 14.7 of [RFC 2616].

5.10.6   DELETE

Method not allowed by the resource. The returned HTTP error status is 405. The server should also include the 'Allow: GET' field in the response as per section 14.7 of [RFC 2616].

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Appendix A.   Change History   (Informative)

A.1   Approved Version History

Reference	Date	Description
OMA-TS-ParlayREST_DeviceCapabilities-V1_0-20120724-A	24 Jul 2012	Approved by TP TP ref# OMA-TP-2012-0280-INP_ParlayREST_2_0_for_Final_Approval

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Appendix B.   Static Conformance Requirements   (Normative)

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

B.1   SCR for ParlayREST.DevCap Server

Item	Function	Reference	Requirement
PARLAYREST-DEVCAP-SUPPORT-S-001-M	Support for the Device Capabilities REST API	5	
PARLAYREST-DEVCAP-SUPPORT-S-002-M	Support for the XML request & response format	5	
PARLAYREST-DEVCAP-SUPPORT-S-003-M	Support for the JSON request & response format	5	
PARLAYREST-DEVCAP-SUPPORT-S-004-O	Support for the application/form-urlencoded format	Appendix C	

B.1.1   SCR for ParlayREST.DevCap.AccCap Server

Item	Function	Reference	Requirement
PARLAYREST-DEVCAP-ACCCAP-S-001-M	Support access to device(s) capabilities	5.4	
PARLAYREST-DEVCAP-ACCCAP-S-002-M	Read device(s) capabilities - GET	5.4.3	

B.1.2   SCR for ParlayREST.DevCap.List.Subscr Server

Item	Function	Reference	Requirement
PARLAYREST-DEVCAP-SUBSCR-S-001-M	Support subscriptions for capabilities changes notifications	5.5	
PARLAYREST-DEVCAP-SUBSCR-S-002-O	Read list of subscriptions - GET	5.5.3	
PARLAYREST-DEVCAP-SUBSCR-S-003-M	Create subscription for capabilities changes notifications - POST	5.7.5 C.1	

B.1.3   SCR for ParlayREST.DevCap.Individual.Subscr Server

Item	Function	Reference	Requirement
PARLAYREST-DEVCAP-IND-SUBSCR-S-001-M	Support for control and read access to individual subscription for capabilities	5.6	PARLAYREST-DEVCAP-IND-SUBSCR-S-002-O

Error! Reference source not found.

Item	Function	Reference	Requirement
	changes notifications		
PARLAYREST-DEVCAP-IND-SUBSCR-S-002-O	Read individual subscription for capabilities changes notifications - GET	5.6.3	
PARLAYREST-DEVCAP-IND-SUBSCR-S-003-M	Delete individual subscription for capabilities changes notifications - DELETE	5.6.6	

B.1.4   SCR for ParlayREST.DevCap.Notif Server

Item	Function	Reference	Requirement
PARLAYREST-DEVCAP-NOTIF-S-001-M	Support for notifying application about device capabilities changes	5.7	
PARLAYREST-DEVCAP-NOTIF-S-002-M	Notify application about device capabilities changes - POST	5.7.5	

B.1.5   SCR for ParlayREST.DevCap.AccConfig Server

Item	Function	Reference	Requirement
PARLAYREST-DEVCAP-ACCCONFIG-S-001-O	Support for access to device(s) configurations	5.8 5.9 5.10	PARLAYREST-DEVCAP-MANAGECONFIG-S-002-O AND/OR PARLAYREST-DEVCAP-MANAGECONFIG-S-003-O AND/OR PARLAYREST-DEVCAP-MANAGECONFIG-S-004-O
PARLAYREST-DEVCAP-ACCCONFIG-S-002-O	Push configuration to a device - POST	5.8.5 C.2	
PARLAYREST-DEVCAP-ACCCONFIG-S-003-O	Read available configurations for device(s) - GET	5.9.3	
PARLAYREST-DEVCAP-ACCCONFIG-S-004-O	Read configuration history for device(s) - GET	5.10.3	

Error! Reference source not found.

Appendix C. Application/x-www-form-urlencoded Request Format for Selected POST Operations (Normative)

This section defines a format for DeviceCapabilities REST API requests where the body of the request is encoded using the application/x-www-form-urlencoded MIME type.

The encoding is defined below for all DeviceCapabilities REST operations which are based on POST requests.

Note: only the request body is encoded as application/x-www-form-urlencoded, the response is still encoded as XML or JSON depending on the preference of the client and the capabilities of the server.

The following DeviceCapabilities REST operations are defined in this section:

- Create a subscription for device capabilities changes notification

- Push a configuration to a device

C.1   Start device capabilities changes notifications

This operation is used to create a new device capabilities change subscription to notifications for the identified device(s).

This REST operation is used by the application to start the device change notifications. It MUST use the HTTP POST operation. If the operation was successful, it returns an HTTP Status of "201 Created".

The following parameters are defined:

Name	Type/Values	Optional	Description
timeCreated	xsd:dateTime	No	Timestamp for when the subscription has been created
notifyURL	xsd:anyURI	No	Notification endpoint definition
callbackData	xsd: string	Yes	Data the application can register with the server when subscribing to notifications, and that are passed back unchanged in each of the related notifications.
notificationFormat	xsd: string	Yes	Default: XML Application can specify format of the resource representation in notifications that are related to this subscription. The choice is between {XML, JSON}
clientCorrelator	xsd:string	Yes	A correlator that the client can use to tag this particular resource representation during a request to create a resource on the server. This field SHOULD be present. Note: this allows the client to recover from communication failures during resource creation and therefore avoids re-sending the message in such situations. In case the field is present, the server SHALL not alter its value, and SHALL provide it as part of the representation of this resource. In case the field is not present, the server SHALL NOT generate it.

C.1.1   Example   (Informative)

C.1.1.1   Request

```
POST /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions HTTP/1.1
Host: example.com
Content-Type: application/x-www-form-urlencoded
Accept: application/xml

timeCreated=2010-03-21T13:23:21Z&
clientCorrelator=54321&
notifyURL=http://application.example.com/notifications/DeliveryInfoNotification&
callbackData=12345&
notificationFormat=XML
```

C.1.1.2   Response

```
HTTP/1.1 201 Created
Content-Type: application/xml
Location: http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

<?xml version="1.0" encoding="UTF-8"?>
<dc:deviceCapabilitiesChangeSubscription xmlns:dc="urn:oma:xml:rest:devicecapabilities:1">
    <timeCreated>2010-03-21T13:23:21Z</timeCreated>
    <callbackReference>
        <notifyURL>http://application.example.com/notifications/CapabilitiesChangeNotification</notifyURL>
        <callbackData>12345</callbackData>
        <notificationFormat>XML</notificationFormat>
    </callbackReference>
    <clientCorrelator>54321</clientCorrelator>
    <resourceURL>http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123</resourceURL>
</dc:deviceCapabilitiesChangeSubscription>
```

C.2   Push a Configuration to a Device

This operation is used to push a configuration to a device/group of devices.

It MUST use the HTTP POST operation. If the operation was successful, it returns an HTTP Status of "201 Created".

The following parameters are defined:

Name	Type/Values	Optional	Description
configurationId	xsd:string	No	A unique identifier for the configuration
name	xsd:string	No	The name of the configuration.
description	xsd:string	No	The description of the configuration

Error! Reference source not found.

C.2.1   Example   (Informative)

C.2.1.1   Request

POST /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration HTTP/1.1
Host: example.com

Content-Type: application/x-www-form-urlencoded
Content-Length: nnnn

configurationId=config12345 &
name=configname12345 &

description=configdescription12345

C.2.1.2   Response

HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT

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Appendix D.   JSON examples   (Informative)

JSON (JavaScript Object Notation) is a lightweight, text-based, language-independent data interchange format. It provides a simple means to represent basic name-value pairs, arrays and objects. JSON is relatively trivial to parse and evaluate using standard JavaScript libraries, and hence is suited for Parlay REST invocations from browsers or other processors with JavaScript engines. Further information on JSON can be found at [RFC 4627].

The following examples show the request and response for various operations using a JSON binding. The examples follow the XML to JSON serialization rules in [OMA_REST_TS_Common]. A JSON response can be obtained by using the content type negotiation mechanism specified in [OMA_REST_TS_Common].

For full details on the operations themselves please refer to the section number indicated.

D.1   Get device capabilities (section 5.4.3.1)

Request:

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/capabilities HTTP/1.1
Accept: application/json
Host: example.com
```

Response:

```
 HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

{"deviceCapabilities": {
    "deviceId": "123456789012345",
    "link": {
        "href": "http://example.com/exampleconfigurations/exampledeviceprofiles/A1234xyz123.xml",
        "rel": "UserAgentProfileReference"
    },
    "name": "devname123",
    "resourceURL": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/capabilities"
}}
```

D.2   Get list of subscriptions (section 5.5.3.1)

Request:

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions?resFormat=JSON HTTP/1.1
Host: example.com
```

Response:

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: nnnn
```

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```
Date: Thu, 04 Jun 2010 02:52:00 GMT

{"deviceCapabilitiesChangeSubscriptionList": {
   "deviceCapabilitiesChangeSubscription": {
      "callbackReference": {
         "callbackData": "12345",
         "notifyURL": "http://application.example.com/notifications/CapabilitiesChangeNotification"
      },
      "clientCorrelator": "54321",
      "resourceURL": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123",
      "timeCreated": "2010-03-21T13:23:21Z"
   },
   "resourceURL": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions"
}}
```

D.3 Subscribe to device capabilities changes notifications for single device (section 5.5.5.1)

Request:

```
POST /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions HTTP/1.1
Accept: application/json
Host: example.com

{"deviceCapabilitiesChangeSubscription": {
   "callbackReference": {
      "callbackData": "12345",
      "notificationFormat": "JSON",
      "notifyURL": "http://application.example.com/notifications/CapabilitiesChangeNotification"
   },
   "clientCorrelator": "54321",
   "timeCreated": "2010-03-21T13:23:21Z"
}}
```

Response:

```
HTTP/1.1 201 Created
Content-Type: application/json
Location: http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

{"deviceCapabilitiesChangeSubscription": {
   "callbackReference": {
      "callbackData": "12345",
      "notificationFormat": "JSON",
      "notifyURL": "http://application.example.com/notifications/CapabilitiesChangeNotification"
   },
   "clientCorrelator": "54321",
```

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```
    "resourceURL": " http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123",
    "timeCreated": "2010-03-21T13:23:21Z"
}}
```

D.4   Get subscription (section 5.6.3.1)

Request:

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123 HTTP/1.1
Accept: application/json
Host: example.com
```

Response:

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: nnnn
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"deviceCapabilitiesChangeSubscription": {
    "callbackReference": {
        "callbackData": "12345",
        "notifyURL": "http://application.example.com/notifications/CapabilitiesChangeNotification"
    },
    "clientCorrelator": "54321",
    "resourceURL": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123",
    "timeCreated": "2010-03-21T13:23:21Z"
}}
```

D.5   Delete subscription (section 5.6.6.1)

Request:

```
DELETE /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscription HTTP/1.1
Accept: application/json
Host: example.com
```

Response:

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

D.6   Device capabilities changes notification (section 5.7.5.1)

Request:

```
POST /notifications/CapabilityChangeNotification HTTP/1.1
```

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```
Content-Type: application/json
Content-Length: nnnn
Host: application:example.com


{"deviceCapabilitiesNotification": {
    "callbackData": "12345",
    "changeNotificationEnd": "false",
    "deviceAddress": "tel:+1-555-555-0100",
    "deviceId": "123456789012345",
    "link": [
        {
            "href": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123",
            "rel": "DeviceCapabilitiesChangeSubscription"
        },
        {
            "href": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/capabilities",
            "rel": "DeviceCapabilities"
        },
        {
            "href": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration",
            "rel": "DeviceConfiguration"
        }
    ]
}}
```

Response:

```
HTTP/1.1 204 No content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

D.7   End of changes notification (section 5.7.5.2)

Request:

```
POST /notifications/CapabilityChangeNotification HTTP/1.1
Content-Type: application/json
Content-Length: nnnn
Host: application:example.com


{"deviceCapabilitiesNotification": {
    "callbackData": "12345",
    "changeNotificationEnd": "true",
    "deviceAddress": "tel:+1-555-555-0100",
    "deviceId": "123456789012345",
    "link": [
        {
            "href": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123",
            "rel": "DeviceCapabilitiesChangeSubscription"
```

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```
        },
        {
            "href": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/capabilities",
            "rel": "DeviceCapabilities"
        },
        {
            "href": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration",
            "rel": "DeviceConfiguration"
        }
    ]
}}
```

Response:

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

D.8   Error notification (notification cancellation) (section 5.7.5.3)

Request:

```
POST /notifications/CapabilityChangeNotification HTTP/1.1
Content-Type: application/json
Content-Length: nnnn
Host: application:example.com

{"deviceCapabilitiesCancellationNotification": {
    "callbackData": "12345",
    "deviceAddress": "tel:+1-555-555-0100",
    "link": [
        {
            "href": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/subscriptions/sub123",
            "rel": "DeviceCapabilitiesChangeSubscription"
        },
        {
            "href": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/capabilities",
            "rel": "DeviceCapabilities"
        },
        {
            "href": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration",
            "rel": "DeviceConfiguration"
        }
    ],
    "reason": {
        "messageId": "SVC0001",
        "text": "A service error occurred. %1 %2",
        "variables": [
            "Status information is not available for",
            " tel:+1-555-555-0100"
```

Error! Reference source not found.

```
    ]
  }
}}
```

Response:

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

D.9   Push configuration to single device (section 5.8.5.1)

Request:

```
POST /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration HTTP/1.1
Host: example.com
Content-Type: application/json
Content-Length: nnnn

{"deviceConfiguration": {
    "configurationId": "config12345",
    "description": "configdescription12345",
    "name": "configname12345"
}}
```

Response:

```
HTTP/1.1 204 No Content
Date: Thu, 04 Jun 2010 02:52:00 GMT
```

D.10   Retrieve available device configurations (section 5.9.3.1)

Request:

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration/available HTTP/1.1
Accept: application/json
Host: example.com
```

Response:

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: nnnn
Date: Thu, 04 Jun 2009 02:51:59 GMT

{"deviceConfigurationList": {
```

Error! Reference source not found.

```
    "deviceConfiguration": [
      {
         "configurationId": "config12345",
         "description": "configdescription12345",
         "link": {
            "href": "http://example.com/exampleconfigurations/exampledeviceconfig/12345.xml",
            "rel": "ConfigurationProfileReference"
         },
         "name": "configname12345"
      },
      {
         "configurationId": "config12346",
         "description": "configdescription12346",
         "link": {
            "href": "http://example.com/exampleconfigurations/exampledeviceconfig/12346.xml",
            "rel": "ConfigurationProfileReference"
         },
         "name": "configname12346"
      },
      {
         "configurationId": "config12347",
         "description": "configdescription12347",
         "link": {
            "href": "http://example.com/exampleconfigurations/exampledeviceconfig/12347.xml",
            "rel": "ConfigurationProfileReference"
         },
         "name": "configname12347"
      }
    ],
    "resourceURL": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration/available"
}}
```

D.11 Retrieve configuration history (section 5.10.3.1)

Request:

```
GET /exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration/history HTTP/1.1
Accept: application/json
Host: example.com
```

Response:

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: nnnn
Date: Thu, 04 Jun 2010 02:52:00 GMT

{"deviceConfigurationHistoryList": {
    "configurationHistoryEntry": [
      {
         "deviceConfiguration": {
```

Error! Reference source not found.

```
            "configurationId": "config12345",
            "description": "configdescription12345",
            "link": {
                "href": "http://example.com/exampleconfigurations/exampledeviceconfig/12345.xml",
                "rel": "ConfigurationProfileReference"
            },
            "name": "configname12345"
        },
        "timestamp": "2009-11-19T12:00:00"
    },
    {
        "deviceConfiguration": {
            "configurationId": "config12347",
            "description": "configdescription12347",
            "link": {
                "href": "http://example.com/exampleconfigurations/exampledeviceconfig/12347.xml",
                "rel": "ConfigurationProfileReference"
            },
            "name": "configname12347"
        },
        "timestamp": "2009-10-19T12:00:00"
    }
  ],
  "resourceURL": "http://example.com/exampleAPI/1/devicecapabilities/tel%3A%2B1-555-555-0100/configuration/history"
}}
```

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Appendix E.   Parlay X operations mapping   (Informative)

The table below illustrates the mapping between REST resources/methods and Parlay X equivalent operations.

ParlayREST Resource	ParlayREST Method	ParlayREST section reference	Parlay X equivalent operation
Device capabilities	GET	5.4.3	getCapabilities
Subscriptions for device capabilities changes notifications	POST	5.5.5	startNotification
Individual subscription for device capabilities changes notifications	DELETE	5.6.6	endNotificationRequest
Notification on device capabilities changes	POST	5.7.5	deviceNotification, deviceEnd, and deviceError
Device configuration	POST	5.8.5	pushConfiguration
Available configurations	GET	5.9.3	getConfigurationList
Configuration history	GET	5.10.3	getConfigurationHistory

Table 1: Parlay X operations mapping

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