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New API Proposal: QoS Booking

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- Existing QoD Services provide customers with the ability to set certain profile of QoS to an access network connection **in real time**:
 - QoD API: the developer wants to set the required QoS profile for a certain period of time, after which the network configuration must be set back to the default one.
 - QoD Provisioning API: the developer wants to set the required QoS profile indefinitely, this is, each time that the UE connects to the network, it will use the required QoS profile instead of the default one, until the association is removed.
- In QualityOnDemand Sub Project, I proposed to add support of the booking feature for the API as an enhancement of the existing API definition. (QoD SP Issue#337)
 - There have already been some discussions in SP, especially on a scope of enhancement, a part of user story and a state diagram.
- During the discussion, there was a suggestion to develop a YAML file as a new API definition for this enhancement.

API description (PR#155)



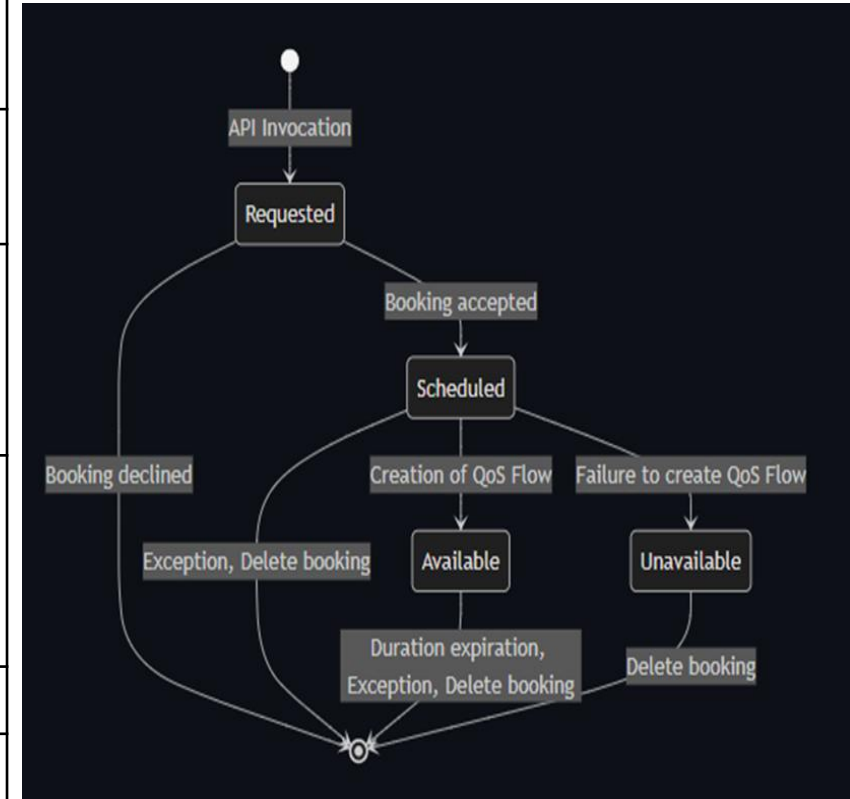
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Field	Description
API family name	QoS Booking
API family owner	KDDI
API summary	<p>This API adds a booking feature on QoS service. This API offers a programmable interface for developers to request an assignment of a certain QoS Profile to a certain device with some conditions such as start time, duration and location in advance.</p> <p>Existing QoS Services, e.g. QoS API and OoS Provisioning API, provide customers with the ability to set certain profile of QoS to an access network connection in real time.:</p> <ul style="list-style-type: none">-QoS API: the developer wants to set the required QoS profile for a certain period of time, after which the network configuration must be set back to the default one.-QoS Provisioning API: the developer wants to set the required QoS profile indefinitely, this is, each time that the UE connects to the network, it will use the required QoS profile instead of the default one, until the association is removed. <p>But there is another possible use case for QoS, which is not currently supported: the developer wants to give a certain device an right to set the required QoS profile in advance. When the requested start time comes, the network configuration for the device set the requested QoS profile. After the requested period of time for the QoS profile, the network configuration must be set back to the default one.</p> <p>Proposed evolution of the existing APIs is to add support for a new booking feature with following operations:</p> <ul style="list-style-type: none">-Creating a booking for required QoS profile-Removing the booking for required QoS profile-Getting the QoS booking details-Updating the QoS booking details for a device <p>Input: Device, QoS Profile, Application server, Start time, Duration, Service area Output: Operation result</p> <p>In case of exception such as network failure, this API notify status change to device.</p>
Technical viability	This API can leverage on the existing QoS services such as CAMARA QoS API, QoS Profile API and OoS Provisioning API.
Commercial viability	This API adds a booking feature on QoS service. This feature is more convenient for those use cases where a limited network, especially radio, resource have to be shared by multiple devices simultaneously at the same place. For example, at the event venue, this feature enables end users to apply and secure the connectivity service on "first come first served" basis in advance.
YAML code available?	YES
Validated in lab/productive environments?	NO
Validated with real customers?	NO
Validated with operators?	NO
Supporters in API Backlog Working Group	List of supporters. NOTE: That shall be added by the Working Group.

User Story (QoS SP Issue#337)



Item	Details
Summary	As an application developer belonging to an enterprise, I want to request a booking for QoS Flow with stable latency and/or stable throughput from a Communication Service Provider (CSP), so that I can ensure better quality of experience for our end users including under network congestion.
Roles, Actors and Scope	Roles: Customer:Developer Actors: Application service providers, hyperscalers, application developers. This User Story does not explicitly describe consent management and hence end users are not included as Actors. Scope: Order To Book - Create/Remove/Get service booking, get notification about the booking
Pre-conditions	The preconditions are listed below: 1. Customer: Developer is eligible to use the QoS Booking API, i.e. the Customer has successfully subscribed to the QoS Booking API on the platform of an API Provider 2. the customer application server has requested and received an access token for the required scopes of the API. Which specific authorization flows are to be used will be determined during onboarding process. 3. Optional: the customer application server has requested the list of available QoS Profiles with the qos-profile API (alternatively an upfront agreed QoS profile will be used)
Activities/Steps	Starts when: The customer application server makes a POST request to the QoS Booking API to book creating a new QoS session with a specified start time and duration, location and an available QoS Profile, and optionally registers a callback URL for receiving notification events. Step1: The platform of the API Provider switches the QoS Flow with requested QoS profile at the specified start time. In case the callback URL was registered, a result to switch QoS Flow is notified to the customer application server. Ends when: The customer application server makes a DELETE request to the QoS Booking API, or the QoS session deletion was triggered automatically because the set duration has expired.
Post-conditions	The specified QoS Flow was provided stable latency or stable throughput and if callback URL was specified, a QoS session termination notification was received at the end.
Exceptions	Several exceptions might occur during the QoS API operations <ul style="list-style-type: none"> - Unauthorized: Not valid credentials (e.g. use of already expired access token). - Invalid input: Not valid input data to invoke operation (e.g. IP address format not as expected). - Conflict: Internal configuration policies didn't allow for operations, e.g. a second QoS session for one device. - Session-not-created: Due to other internal errors, QoS session resource could not be created - Fail to switch the specified QoS at the start time (e.g. due to lack of network resources) - Detect malfunction (e.g. deletion of QoS profile, network trouble) by back-end system during Scheduled and Available status.



The benefit for users is that they can secure the right to high quality connection service in advance, as the number of device which can utilize such service simultaneously is limited in an environment with limited radio resource.

Way forward



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- **Preference:**
 - **Call for supporters**
 - **This API is discussed in QualityOnDemand Sub Project, even if it is approved to create a new API with a new repository.**



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