

## Parameter Definition Attributes for QoS Administrators Overview

As the QoS administrator, you can create a parameter definition that constrains how a QoS client can create a parameter instance. When QoS clients create a parameter instance, they work within the attributes that you have defined.

Table 1 on page 1 lists the parameter attributes that you can define for a parameter definition.

**Table 1: Attributes in Parameter Definitions**

Parameter Data Setting	Description
Name	Name for the parameter.
Instance-interface type	Interface types to which the QoS client can apply a parameter instance. The QoS administrator can specify up to eight instance-interface types for each parameter definition.
Controlled-interface type	Interface types that specify resources that the parameter instance can control. The QoS administrator can specify up to four controlled-interface types for each parameter definition.
Subscriber-interface type	Subscriber interfaces to which QoS clients can apply parameters obtained through RADIUS or profiles. The QoS administrator can specify up to four subscriber-interface types for each parameter definition.
Range	Valid range of values that a QoS client can specify.
Expression	Boolean that indicates whether the parameter uses implicit parameter instances, which are the sum of explicit instances of the parameter on all scheduler nodes or queues above them in the scheduler hierarchy.
Application	Application that binds parameter instance to a specific application, such as IP multicast bandwidth adjustment.

### Naming Guidelines for QoS Parameters

You define the parameter name by issuing the **qos-parameter-define** command to enter QoS Parameter Definition Configuration mode.

The naming guidelines for parameters differ from other QoS features such as QoS profiles and scheduler profiles.

Parameter names must begin with a letter to avoid confusion with numbers and operators. Because QoS clients reference this parameter name to create a parameter instance, we recommend that you use a name that is descriptive.

Table 2 on page 2 lists some sample parameter names and descriptions.

**Table 2: Sample Parameter Names**

Parameter Name	Description
max-subscriber-bandwidth	Total bandwidth for a subscriber (average of all services)
max-voice-bandwidth	Shaping rate for a subscriber voice queue
min-data-bw	Assured rate for a priority-data service queue
max-data-bw	Shaping rate for the same priority data service queue as min-data-sw

In addition, parameter names cannot be the same as an arithmetic operator. Table 3 on page 2 lists examples of valid and invalid parameter names that use operators.

**Table 3: Valid and Invalid Parameter Names**

Valid Names	Invalid Names
n1	1
f+	1 n
-	+
-	+ foo
-	min
-	max

Parameter names are case-sensitive. For example, max-subscriber-bw and max-Subscriber-bw are different parameter names.

Because the shaping rate and shared-shaping rates determine the maximum scheduler rates, and the assured rate determines minimum scheduler rates, we recommend that you use min or max operands in the parameter name.

## **Interface Types and QoS Parameters**

You can specify the following attributes in a parameter definition to control the scope of a parameter on interfaces:

- Controlled-interface types
- Instance-interface types
- Subscriber-interface types

## Controlled-Interface Types

Controlled-interface types specify interface types for queues and scheduler nodes that a parameter instance can control. You can define up to four controlled-interface types for each parameter definition by issuing the **controlled-interface-type** command in QoS Parameter Definition Configuration mode. Examples of controlled interface types include atm-vp (ATM virtual paths), atm-vc (ATM virtual circuits), and VLAN (virtual LANs).

For example, if you specify controlled-interface types of atm-vc and vlan, then you can use the parameter instance to shape or weight an ATM VC or VLAN node. However, because you did not specify ip, the system does not allow this parameter in a scheduler profile that was referenced in a QoS profile with an ip node (for example, ip node scheduler-profile test1).

### Controlled-Interface Type Example

In this example, you configure a parameter definition for a scheduler hierarchy in which a VLAN represents a subscriber. The parameter definition specifies that the parameter controls VLAN nodes and queues and sets the maximum rate for any parameter instance.

```
host1(config)#qos-parameter-define max-subscriber-bandwidth  
host1(config-qos-parameter-define)#controlled-interface-type vlan  
host1(config-qos-parameter-define)#exit
```

Then you reference the parameter definition within a scheduler profile.

```
host1(config)#scheduler-profile subscriber  
host1(config-scheduler-profile)#shared-shaping-rate max-subscriber-bandwidth auto  
host1(config-scheduler-profile)#exit
```

This scheduler profile can be referenced only by QoS profile VLAN rules. When a user attempts to reference the scheduler profile using rules other than VLAN, an error message is displayed. For example, a QoS profile rule cannot associate the scheduler profile with an atm-vc rule, as shown in the following example:

```
host1(config-qos-profile)#atm-vc queue traffic-class best-effort scheduler-profile subscriber  
% scheduler-profile parameter's controlled-interface-type(s) do not control this atm-vc qos-profile rule type
```

After you reference the parameter in a scheduler profile, you can reference the scheduler profile from a QoS profile. In this example, you configure a vlan node for each subscriber with a shared-shaping rate specified by the parameter max-subscriber-bandwidth.

```
host1(config)#qos-profile subscriber-triple-play  
host1(config-qos-profile)#vlan queue traffic-class best-effort scheduler-profile subscriber
```

## Instance-Interface Types

After you configure at least one controlled-interface type, you configure one or more instance-interface types that specify the types of logical interfaces to which the QoS client can apply the parameter. You can define up to eight instance-interface types for each parameter definition by issuing the **instance-interface-type** command in QoS Parameter Definition Configuration mode.

QoS clients cannot create a *downreference* for a parameter instance for instance-interface types that is above the lowest controlled-interface type of the same family in the interface stack.



**NOTE:** The guidelines are different for using instance-interface types with hierarchical parameters. For more information, see Scheduler Profiles and Parameter Expressions for QoS Administrators.

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### Instance-Interface Type Example

In the following example, you configure a parameter definition with a controlled-interface type of VLAN. You then enable QoS clients to create a parameter instances at VLAN, SVLAN, and Ethernet interfaces by configuring instance-interface types of vlan, svlan, and ethernet.

```
host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type svlan
host1(config-qos-parameter-define)#instance-interface-type ethernet
```

In the scheduler hierarchy, IP is above VLANs. If you attempt to configure an instance-interface type for ip, an error message indicates that you cannot downreference IP from VLANs.

```
host1(config-qos-parameter-define)#instance-interface-type ip
% instance-interface-type ip cannot stack above the lowest controlled-interface-type
```

### Subscriber-Interface Types

Subscriber-interface types represent subscriber interfaces to which you can apply QoS parameters obtained through RADIUS or SRC. You can define up to four subscriber-interface types for each parameter definition by issuing the **subscriber-interface-type** command in QoS Parameter Definition Configuration mode.

The following interface types are supported:

- ip
- l2tp-session
- atm-vc
- vlan

QoS clients cannot create a parameter instance for subscriber-interface types that is above the lowest controlled-interface type of the same family in the interface stack.

If an interface profile contains a QoS parameter instance rule of max-subscriber-bandwidth 1000000, the system searches the logical interface column, starting at the top, and associates the parameter instance with the first interface with the subscriber-interface type that it locates.

A RADIUS administrator can enter multiple QoS parameter name and value pairs when configuring the RADIUS server with the Juniper Networks VSA [26-82]. This means that the RADIUS can return multiple instances of the same VSA in a single request. For more information about Juniper Networks VSA [26-82], see Juniper Networks VSAs.

### ***Subscriber-Interface Type Example***

In the following example, you configure a parameter definition with a controlled-interface type and a subscriber-interface type of IP. These settings enable you to create QoS parameter VSAs on an IP interface.

```
host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type ip
host1(config-qos-parameter-define)#instance-interface-type ip
host1(config-qos-parameter-define)#subscriber-interface-type ip
```

## ***Range of QoS Parameters***

You can specify the range of values that the QoS client can enter for a parameter instance by issuing the **range** command in QoS Parameter Definition Configuration mode.

In the following example, you specify that a QoS client can enter a value for the parameter from 512 Kbps to 8 Mbps. The system does not accept values outside of this range.

```
host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#range 512000 8192000
host1(config-qos-parameter-define)#exit
```

If the QoS client attempts to configure values outside of this range, a message is displayed.

```
host1(config)#interface fastEthernet 9/0.1
host1(config-subif)#qos-parameter max-subscriber-bandwidth 1000000
host1(config-subif)#exit
host1(config)#interface fastEthernet 9/0.1
host1(config-subif)#qos-parameter max-subscriber-bandwidth 200000
% parameter instance is out of range
```

You cannot create or modify an existing range if the change causes any explicit parameter instance values to be outside the valid range. For example:

```

host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#controlled-interface-type vlan
host1(config-qos-parameter-define)#instance-interface-type vlan
host1(config-qos-parameter-define)#range 512000 8192000
host1(config-qos-parameter-define)#exit
host1(config)#interface fastEthernet 9/0.1
host1(config-subif)# ! This parameter instance is within the range of 512Kbps to
8Mbps.
host1(config-subif)#qos-parameter max-subscriber-bandwidth 1000000
host1(config-subif)#exit
host1(config)#qos-parameter-define max-subscriber-bandwidth
host1(config-qos-parameter-define)#range 2048000 8192000
% cannot modify a range when parameter instances exist with values outside the new
range

```

However, you can remove ranges by using the **no range** command.



**NOTE:** You can also define a range in parameter expressions when referencing a parameter within a scheduler profile. For more information, see [\[Unresolved xref\]](#).

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## Applications and QoS Parameters

You can associate a parameter definition with an application in the system by issuing the **application** keyword with the **qos-parameter-define** command. The applications that you can configure include:

- IP Multicast Bandwidth Adjustment
- QoS Cell Mode
- Byte Adjustment (Cell and Frame)
- QoS Downstream Rate

### Related Topics

- Configuring a Basic Parameter Definition for QoS Administrators
- IP Multicast Bandwidth Adjustment for QoS Overview
- Cell Shaping Mode Using QoS Parameters Overview
- Byte Adjustment for ADSL and VDSL Traffic Overview
- QoS Downstream Rate Application Overview