Cisco NBAR2 QoS Attributes

Role in Network
Cisco Network Based Application Recognition (NBAR) technology (now in its second generation) boasts an application library of over 1300 applications, many with media sub-component signatures also available, for an approximate total of 1400 distinct applications/sub-applications.

While this richness provides network administrators great flexibility and power in their policy-definitions, it is cumbersome to specify each application/sub-application by name within a QoS policy.

To assist in policy-definition and in browsing the application library, applications are grouped into categories and sub-categories. For example, NBAR application categories include:

- browsing
- business-and-productivity-tools
- email
- file-sharing
- gaming
- industrial-protocols
- instant-messaging
- internet-privacy
- layer3-over-ip
- location-based-services
- net-admin
- newsgroup
- social-networking
- streaming
- voice-and-video

Thus, for example if an administrator wanted to classify all email applications, they could use the match protocol attribute category email command within a class-map.

However, there may be cases where all applications within a given category may not be considered business-relevant, as shown in Figure 1.

Figure 1 Determining Application Business Relevance

Traffic-Class Attribute
The traffic-class attribute aligns NBAR2 applications according to RFC 4594-based traffic-classes. For example, per RFC 4594 "Low Latency Data" applications (commonly referred to as "Bulk Data" applications) includes email, file-transfer and other "background" (i.e. non-user-interactive) applications. As such, rather than having to configure a class map along the lines of:

```
class-map match-any BULK-DATA
match protocol attribute category email
match protocol attribute category file-sharing
match protocol attribute sub-category backup-systems... etc.
```

An administrator can configure all relevant applications matching a specific RFC 4594 traffic-class with a single command (examples of which are shown on the reverse).

The ten RFC 4594 traffic classes for business-relevant applications are shown in Table 2.

Table 2 Traffic-Class NBAR2 Attribute

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>voice-telephony</td>
<td>VoIP telephony (bearer-only) traffic</td>
</tr>
<tr>
<td>broadcast-video</td>
<td>Broadcast TV, live events, video surveillance</td>
</tr>
<tr>
<td>real-time-interactive</td>
<td>High-definition interactive video applications</td>
</tr>
<tr>
<td>multimedia-conferencing</td>
<td>Desktop software multimedia collaboration applications</td>
</tr>
<tr>
<td>multimedia-streaming</td>
<td>Video-on-Demand (VoD) streaming video</td>
</tr>
<tr>
<td>network-control</td>
<td>Network control plane traffic</td>
</tr>
<tr>
<td>signaling</td>
<td>Signaling traffic that supports IP voice and video telephony</td>
</tr>
<tr>
<td>ops-admin-ngmst</td>
<td>Network operations, administration, and management traffic</td>
</tr>
<tr>
<td>transactional-data</td>
<td>Interactive data applications</td>
</tr>
<tr>
<td>bulk-data</td>
<td>Non-interactive data applications</td>
</tr>
</tbody>
</table>

Thus, with these new attributes, all 1400 NBAR2 applications can be configured into a 12-class RFC 4594-based QoS model with a straightforward and user-intuitive syntax, as is shown on the reverse.

Business-Relevance Attribute
The business-relevance attribute allows an administrator to classify a given application to one of three levels of business relevancy, as shown in Table 1.

Table 1 Business-Relevance NBAR2 Attribute

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>business-relevant</td>
<td>Business critical applications</td>
</tr>
<tr>
<td>default</td>
<td>Related business applications</td>
</tr>
<tr>
<td>business-irrelevant</td>
<td>Non-business applications</td>
</tr>
</tbody>
</table>

All applications within the NBAR2 library has been pre-populated with the most common business-relevance attribute. For example, youtube by default is set as business-irrelevant, as most customers typically classify this application as such. However, this may not be the case across the board; for example, some businesses may be using YouTube for training purposes. In such cases, an administrator can change this business-relevancy setting to align with their objectives.

A business-irrelevant application is intended for a RFC 3662 “Scavenger” treatment. An application with a business-relevancy setting of default is intended for a RFC 2474 Default Forwarding treatment. In turn, business-relevant applications are intended to be serviced within their respective RFC 4594 traffic-class.
Step 1: Configure NBAR2 (Business-Relevance and Traffic-Class) Class-Maps

```plaintext
class-map match-all VOICE
  match protocol attribute traffic-class voip-telephony
  match protocol attribute business-relevance business-relevant

class-map match-all BROADCAST-VIDEO
  match protocol attribute traffic-class broadcast-video
  match protocol attribute business-relevance business-relevant

class-map match-all INTERACTIVE-VIDEO
  match protocol attribute traffic-class real-time-interactive
  match protocol attribute business-relevance business-relevant

class-map match-all MULTIMEDIA-CONFERENCING
  match protocol attribute traffic-class multimedia-conferencing
  match protocol attribute business-relevance business-relevant

class-map match-all MULTIMEDIA-STREAMING
  match protocol attribute traffic-class multimedia-streaming
  match protocol attribute business-relevance business-relevant

class-map match-all SIGNALING
  match protocol attribute traffic-class signaling
  match protocol attribute business-relevance business-relevant

class-map match-all NETWORK-CONTROL
  match protocol attribute traffic-class network-control
  match protocol attribute business-relevance business-relevant

class-map match-all NETWORK-MANAGEMENT
  match protocol attribute traffic-class ops-admin-mgmt
  match protocol attribute business-relevance business-relevant

class-map match-all TRANSACTIONAL-DATA
  match protocol attribute traffic-class transactional-data
  match protocol attribute business-relevance business-relevant

class-map match-all BULK-DATA
  match protocol attribute traffic-class bulk-data
  match protocol attribute business-relevance business-relevant

class-map match-all SCAVENGER
  match protocol attribute business-relevance business-irrelevant
```

Step 2: Configure Marking Policy-Map

```plaintext
policy-map MARKING
  class VOICE
    set dscp ef
  class BROADCAST-VIDEO
    set dscp cs5
  class INTERACTIVE-VIDEO
    set dscp cs4
  class MULTIMEDIA-CONFERENCING
    set dscp af41
  class MULTIMEDIA-STREAMING
    set dscp af31
  class SIGNALING
    set dscp cs3
  class NETWORK-CONTROL
    set dscp cs6
  class NETWORK-MANAGEMENT
    set dscp cs2
  class TRANSACTIONAL-DATA
    set dscp af21
  class BULK-DATA
    set dscp af11
  class SCAVENGER
    set dscp cs1
  class class-default
    set dscp default
```

Step 3: Attach the Policy-Map to the Interface(s)

```plaintext
service-policy input MARKING
```

Note: Highlighted commands are interface specific; otherwise these are global.