Configuring the Transport Stream Information

This section describes how to set up and configure the transport stream outputs in the D9800 Network Transport Receiver.

- Transport Stream Outputs, on page 1
- Configuring the ASI or MPEGoIP Output General Settings, on page 3
- Configuring the ASI or MPEGoIP Output Mode, on page 4
- Configuring the MPE Settings, on page 6
- Setting Up Redundancy Controls for MPEG over IP and MPE Outputs, on page 7
- Synchronizing the Output Services, on page 8
- Resolving Conflicts, on page 11
- Setting up the DPM Program Entries, on page 12
- Copying between ASI and MPEGoIP DPM Settings, on page 15
- Configuring the Program Entries, on page 16
- Setting the SAP IP Address, on page 18
- Setting the Transport Packet Limits, on page 19
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- Configuring MPEG over IP or IP Data Streams, on page 22
- Configuring the Transcoder Settings, on page 23

Transport Stream Outputs

The ASI and MPEGoIP transport outputs are individually configurable and provide the capability of carrying a decrypted program for digital tier distribution. This helps the compressed video programs are efficiently distributed to households equipped with digital set-top boxes. Digital Program Insertion (DPI) information will also be available along with the video and audio PIDs (Packet Identifiers) for external ad insertion in compressed digital format.

DVB-ASI Output

The D9800 receiver has one DVB-ASI output. This output can be used as an input for a DVB-T transmitter or other types of DVB-ASI reception equipment.
MPEGoIP Output

The MPEGoIP output provides a number of output modes including the capability of carrying a decrypted program for digital tier distribution. This helps ensure that compressed video programs are efficiently distributed to households equipped with digital set-top boxes. Digital Program Insertion (DPI) information will also be available along with the video and audio PIDs (Packet Identifiers) for external ad-insertion in compressed digital format.

The diagram below shows an example of the D9800 receiver used in an MPEGoIP application.

MPE Output

The Multiprotocol Encapsulation (MPE) output provides a means to carry packet oriented IP protocols on top of a transport stream. The MPE output receives IP packets from the transport stream and the IP data can be sent through an Ethernet switch to an IP router or directly to a receiving device.

The diagram below shows an example of the D9800 receiver used in an MPE application.

SDI Outputs

Note

The SDI outputs are available on single-stream units only.
The D9800 receiver is designed for satellite content distribution applications requiring DVB-S and DVB-S2 reception capabilities with advanced digital outputs for digital tier program distribution. A built-in decoder is capable of decoding an MPEG-2 or MPEG-4 High Definition (HD) program for analog monitoring. A high-quality SDI output version is available for re-encoding applications.

The diagram below shows an example of the D9800 receiver used in SDI monitoring applications.

**Configuring the ASI or MPEGoIP Output General Settings**

**Step 1**  
Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose **Transport Stream** > **ASI Output** or **MPEG over IP**.
- Front Panel (single-stream unit): From the Main Menu of the D9800 front panel, choose **Setup** > **Outputs** > **TS Out** > **ASI** or **MOIP**.
- Front Panel (multi-stream unit): From the Main Menu of the D9800 front panel, choose **Setup** > **Outputs** > **TS Out** > **ASI** or **IP**, and choose the input you want to configure from the **ASI** or **IP** front panel menu.

**Step 2**  
The **Rate Control** drop-down list is set to User, as the method used to calculate the output rate. The output rate is specified by the **User Rate** field or front panel menu. It is determined by the user setting regardless of the input source.

**Step 3**  
In the **User Rate** field or front panel menu, choose the maximum output bit rate expected by the equipment connected to the ASI or MPEGoIP output (0 to 206 Mbps).

**Note**  
The output data may be lost if this bit rate is set to a value less than the actual bit rate.

**Step 4**  
From the **Descrambled** drop-down list, or the **Descramble Mode** front panel menu, choose whether to descramble the output if the input is descrambled. The following describes the available options:

- Scrambled - The output channel remains scrambled, even if the PE is authorized and can descramble the channel.
- Descrambled (default) - Descrambles the output channel, and passes in-the-clear channels.

**Step 5**  
For ASI output, choose Yes or No from the **Null Packet Insertion** drop-down list, or the **Insert Null Packet** front panel menu to determine whether to insert null packets into the output to maintain output at a constant bit rate. Null packets are always inserted if the configured output bit rate is higher than the payload rate of the transport stream to be encapsulated.

For MPEGoIP output or IP Data output, the **Null Packet Insertion** drop-down list, or the **Insert Null Packet** front panel menu is set to Yes.

**Step 6**  
Apply your changes.
Configuring the ASI or MPEGoIP Output Mode

Step 1
Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose Transport Stream > ASI Output or MPEG over IP Output.
- Front Panel (single-stream unit): From the Main Menu of the D9800 front panel, choose Setup > Outputs > TS Out > ASI or MOIP.
- Front Panel (multi-stream unit): From the Main Menu of the D9800 front panel, choose Setup > Outputs > TS Out > ASI or IP, and choose the input you want to configure general settings from the ASI or IP front panel menu.

Step 2
From the Output Mode drop-down list or front panel menu, choose the DPM output mode for the current output. With the exception of No Output, choosing a mode will configure the DPM settings to achieve the specified behavior. In this way, they act as DPM presets. We highly recommend that you use either one of the basic modes (Passthrough or Service Channels Only), or, for advanced setup, enter the DPM mapping before setting the output mode.

Each PE in the Single Program Transport Stream (SPTS) creates its own transport stream, which includes PAT, CAT, SDT, and PMT tables for one service channel only, as well as ES PIDs for the PE.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Output</td>
<td>No ASI, MPEGoIP, or IP output will be generated and the ASI or DATA ports will be disabled.</td>
</tr>
<tr>
<td>Passthrough</td>
<td>All PEs will be set to Pass and other DPM settings will also be set.</td>
</tr>
<tr>
<td>Service Channels Only</td>
<td>This is similar to Passthrough, except that only channels applied to program entries are available on the output.</td>
</tr>
<tr>
<td>MAP Passthrough</td>
<td>The output will be identical to the input, except that channels assigned to PEs and PIDs will be mapped using the DPM settings. If the input is tuned to a valid channel, the PEs are automatically set to Map. Otherwise, the PEs are automatically set to Drop. When choosing MAP Passthrough, a message appears to confirm that you want to resynchronize the output changes and PIDs to match the selected input programs. Click or choose Yes to set the DPM mapping to the last valid (or saved) configuration. Click or choose No to use the existing DPM maps. Note: If the PE is mapped, it uses the last saved output MAP configuration. The output map (for example, output channel PMT) does not change automatically if the input or channel number is changed.</td>
</tr>
<tr>
<td>MAP Service Channels Only</td>
<td>This is similar to MAP Passthrough, except that only channels applied to program entries are available on the output. If the input is tuned to a valid channel, the PEs are automatically set to Map. Otherwise, the PEs are automatically set to Drop. When choosing MAP Service Channels Only, a message appears to confirm that you want to resynchronize the output changes and PIDs to match the selected input programs. Click or choose Yes to set the DPM mapping to the last valid (or saved) configuration. Click or choose No to use the existing DPM maps.</td>
</tr>
<tr>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Note</td>
<td>If the PE is mapped, it uses the last valid input. The output map (for example, output channel PMT) does not change automatically if the input or channel number is changed.</td>
</tr>
<tr>
<td>Transcoding (multi-stream units only)</td>
<td>The output will be generated using the DPM MAP settings, except that the DPM Action will be set to XCode and the Descrambled mode will be set to Descrambled. If the input is tuned to a valid channel, the PEs are automatically set to XCode. Otherwise, the PEs are automatically set to Drop.</td>
</tr>
<tr>
<td>Note</td>
<td>If the PE is transcoded, it uses the last valid input. The output map (for example, output channel PMT) does not change automatically if the input or channel number is changed.</td>
</tr>
<tr>
<td>SPTS Service Channels Only (MPEG over IP only)</td>
<td>The service channel is passed with the same channel number, PMT PIDs, and ESP PIDs.</td>
</tr>
<tr>
<td>SPTS MAP Service Channels Only (MPEG over IP only)</td>
<td>The service channel is mapped to the preconfigured channel number, PMT PIDs, and ESP PIDs.</td>
</tr>
<tr>
<td>SPTS Transcoding (multi-stream units only)</td>
<td>The service channel is mapped to the preconfigured channel number, PMT PIDs, and ESP PIDs. The PEs are automatically set to XCode.</td>
</tr>
</tbody>
</table>

You are prompted to Resync All for the selected output. This resynchronizes the inputs to outputs for the current PMT according to the service assignments and the PIDs for the PE.

The **Mode Status** field, or the **Config Type** front panel menu, indicates the current DPM configuration change by a user after changing the Output Mode. The following table lists the statuses:

<table>
<thead>
<tr>
<th>Mode Status or Config Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unmodified</td>
<td>No changes were made after setting a new output mode.</td>
</tr>
<tr>
<td></td>
<td>In a multi-stream unit, this applies to single input mode only. For more information on single input mode, see Assigning a Channel to a Program Entry.</td>
</tr>
<tr>
<td></td>
<td>In a multi input mode, <strong>Unmodified (MS Mode)</strong> status is displayed.</td>
</tr>
<tr>
<td>Edited by User</td>
<td>DPM changes were made by the user after setting the Output Mode.</td>
</tr>
<tr>
<td></td>
<td>In a multi-stream unit, this applies to a single input mode only. For more information on the single input mode, see Assigning a Channel to a Program Entry.</td>
</tr>
<tr>
<td></td>
<td>In a multi input mode, <strong>Edited by User (MS Mode)</strong> status is displayed.</td>
</tr>
</tbody>
</table>
### Configuring the MPE Settings

<table>
<thead>
<tr>
<th>Mode Status or Config Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Re-Mapped</td>
<td>The output map changed automatically to fix the output channel or PID conflicts at the time of setup. In a multi-stream unit, this applies to a single input mode only. For more information on the single input mode, see Assigning a Channel to a Program Entry. In a multi input mode, <strong>Auto re-mapped (MS Mode)</strong> status is displayed.</td>
</tr>
<tr>
<td>Chg by Uplink</td>
<td>DPM output changes were made, based on the uplink request after setting the Output Mode. In a multi-stream unit, this applies to a single input mode only. For more information on the single input mode, see Assigning a Channel to a Program Entry. In a multi input mode, <strong>Chg by Uplink (MS Mode)</strong> status is displayed.</td>
</tr>
<tr>
<td>Auto-Adjusted</td>
<td>This is for multi-stream units only. It indicates that the Auto-Adjusted (MS Mode) status has not changed, but input mode has changed from a multi input mode to a single input mode. For more information on single input and multi input modes, see Assigning a Channel to a Program Entry.</td>
</tr>
<tr>
<td>Auto-Adjusted (MS Mode)</td>
<td>This is for multi-stream units only. DPM changes were made automatically when switching from single input mode to multi input mode. For more information on the DPM changes, see Assigning a Channel to a Program Entry.</td>
</tr>
</tbody>
</table>

#### Step 3

Apply your changes.

If the changes cannot be saved, a message is displayed indicating “Bad configuration data”.

**Note**  
When remapping an input program channel to an output channel, ensure that the PIDs are mapped to different PIDs to avoid PID collisions.

---

**Configuring the MPE Settings**

**Note**  
The MPE data output is only available on single-stream units with MPEGoIP Input/Output option installed (D9800-SS-MPEGOIP).
Step 1  From the D9800 web GUI, choose System Settings > MPE. Or, from the Main Menu of the D9800 front panel, choose Setup > IP > Protocols.

Step 2  From the MPE Data Filter Mode drop-down list or the MPE front panel menu, choose whether the MPE data is forwarded to the network.

- Forward None - Do not forward MPE data to the network.
- Forward All - Forward all the MPE data to the network.
- Forward Filtered - Only forward the MPE data from the defined Static Multicast Filter table below to the network.

Note  The receiver supports up to a maximum of 10 Mbps throughput when forward 1500 byte packets.

If MPE Data Filter Mode is set to Forward Filtered, do the following to add a static multicast filter address in the Static Multicast Filtering area:

1. Click the + icon to add a row.
2. In the Multicast Filter Addresses field, enter the IP address that sets the destination for multicast MPE data, in the range from 224.0.0.0 to 239.0.0.0.
3. Click Save.

Step 3  Apply the changes.

What to do next
To edit or delete an existing multicast filter address, click the radio button of the address entry and click edit (تواصل) to edit the entry, or click delete (حذف) to remove the entry.

Setting Up Redundancy Controls for MPEG over IP and MPE Outputs

The Redundancy Control area allows you to configure redundancy for MPEG over IP or IP Data, and MPE outputs when an active port fails due to a physical connectivity loss. The DATA1 and DATA2 connectors, and DATA3 and DATA4 connectors (multi-stream units only) on the rear panel are used as redundant port pairs.

Step 1  Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose Transport Stream > MPEG over IP Output, or choose System Settings > MPE.


- Front Panel: From the Main Menu of the D9800 front panel, choose Setup > IP > Redundancy.
**Step 2**  Refer to the **Redundancy Control** area.

**Step 3**  From the **Mode** drop-down list or front panel menu, choose one of the following:

- **Manual**: First Port or Manual: Second Port - For single-stream units, the setting only uses DATA 1 or DATA 2 port for output data. If you are configuring redundancy for IP Data 3/Data 4 Output on a multi-stream unit, First Port is the DATA 3 port, and Second Port is the DATA 4 port. The remaining redundancy controls below are not applicable.

- **Backup**: First Port or Backup: Second Port - Use DATA 1 or DATA 2 port as the primary data port and if a physical connectivity loss occurs, it will failover to the backup port. The backup port is the port that is not used as a primary port in a port pair. For example, if Data 1 is the primary port, the backup port is Data 2. If you are configuring redundancy for IP Data 3/Data 4 Output on a multi-stream unit, First Port is the DATA 3 port, and Second Port is the DATA 4 port. See Step 4 to configure specific settings for this mode.

- **Mirroring** - Send the same data to both DATA 1 and DATA 2 ports, or DATA 3 and DATA 4 ports. The remaining redundancy controls below are not applicable.

**Step 4**  If Backup: First Port or Backup: Second Port is set as the **Mode**, choose one of the following from the **Direction** drop-down list or front panel menu:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revertive</td>
<td>Attempt to revert back to the primary port when using the backup port and the primary port is active again. Set the following parameters:</td>
</tr>
<tr>
<td></td>
<td>• <strong>Delay Forward</strong> - Set the time to switch the data port after the system detects a failure, in a range from 0 to 10000 milliseconds.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Delay Back</strong> - Set the time to wait when reverting back to the primary port once the primary link is active again, in a range from 1 to 120 seconds.</td>
</tr>
</tbody>
</table>

| Non-Revertive | If the system detects a link loss, the primary port will failover to the backup port (if active). If the backup port is active and it detects a link loss, and the primary link is active, it will attempt to switch back to the primary port. Set the following parameter: |
|              | • **Delay Forward** - Set the time to switch the data port after the system detects a failure, in a range from 0 to 10000 milliseconds. |

**Step 5**  Apply the changes.

You can view the latest redundancy status changes in the **Redundancy Status** area. The **Ports In Use** column displays the current output port in use, the **Change Reason** column displays a description of the reason for the last redundancy status change (Link or Setup+Link), and the **Change Date & Time** column displays the last date and time the redundancy status changed.

---

**Synchronizing the Output Services**

There are two methods for resynchronizing the program entry output with its input: resynchronize or resynchronize all. The resynchronize option allows you to customize the synchronization. The resynchronize all option synchronizes all the DPM output with the PMT data for all the program entries on the selected output.
Step 1  Do one of the following:

• Web GUI (single-stream unit): From the D9800 web GUI, choose **Transport Stream > Digital Program Mapping** for ASI or MPEG over IP.
• Web GUI (multi-stream unit): From the D9800 web GUI, choose **Transport Stream > Digital Program Mapping** for ASI 1 Output, ASI 2 Output, IP Data 1/Data 2 Output, or IP Data 3/Data 4 output.
• Front Panel: From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > DPM**.

Step 2  In the **DPM Program Entry Setup** area, do one of the following:

• Click **Resynchronize All** all the DPM output with the PMT data for all the program entries on the selected output. Or, select the **Global** front panel menu and choose the output.
• Click the radio button of the program entry you want to synchronize and then click **Resynchronize** to synchronize each PE output to its input according to one of the four output modes listed below. Or, select the **ASI**, **MOIP**, or **IP** front panel menu, choose the program entry you want to synchronize from the **PE Resync** menu, and then choose one of the four options below.

<table>
<thead>
<tr>
<th>Web GUI option</th>
<th>Front Panel option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resynchronize Program, PMT PID, ES List &amp; ES PIDs</td>
<td>All</td>
<td>The receiver synchronizes the PE output according to the services and then the PIDs assigned to each service.</td>
</tr>
<tr>
<td>Resynchronize ES List</td>
<td>Svcs</td>
<td>The receiver synchronizes the PE output according to the available input services only, and ignore the input to output service PID mapping. This is useful when you already have PID assignments set for the services, but want to ensure that the services are mapped correctly.</td>
</tr>
<tr>
<td>Resynchronize ES PIDs</td>
<td>PIDs</td>
<td>The receiver synchronizes the PE output according to the input PIDs only, and ignore the service assignment categories/names. This is useful when you already have the services set up, but want to synchronize to the incoming PIDs.</td>
</tr>
<tr>
<td>Resynchronize Template ES List &amp; PIDs</td>
<td>Template</td>
<td>Allows you to preset the input to output mapping of a PE according to the preset template. This is helpful in pre-configuring any number of PEs for future use.</td>
</tr>
</tbody>
</table>

If a conflict occurs, a message that the conflicts will be fixed automatically and to preview the changes prior to saving is displayed. For more information, see **Resolving Conflicts, on page 11**.
Setting up the Auto Synchronization Options

The ASI, MoIP, IP Data 1/Data 2 Auto Sync area or the Auto Map front panel menu allows you to configure the DPM without editing each output channel and PID separately.

**Step 1**
Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose **Transport Stream > ASI Output** or **MPEG over IP Output** and refer to the **Auto Sync** area.
- Front Panel (single-stream unit): From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > ASI** or **MOIP**.
- Web GUI (multi-stream unit): From the D9800 web GUI, choose **Transport Stream > ASI 1 Output**, **ASI 2 Output**, **IP Data 1/Data 2 Output**, or **IP Data 3/Data 4 Output** and refer to the **Auto Sync** area.
- Front Panel (multi-stream unit): From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > ASI1, ASI2, IP1/2, or IP 3/4**.

**Step 2**
From the **Enable Auto Fix for Collision** drop-down list, or the **Auto Map** front panel menu, choose Yes for the DPM to resolve channel and PID collisions automatically on the transport outputs. New values are assigned to the parameters that caused the conflict. The new assigned values are not used by any incoming transport or other PE outputs. If a collision is detected, you can review the new changes and click **Apply** to accept the new changes.

Choose **No** and a detailed list of all the conflicts is displayed in the Output Channel and PID Conflicts table (click **View Conflicts**) when a conflict occurs. You can then resolve the conflicts manually. For information on resolving conflicts, see **Resolving Conflicts**, on page 11. The **Enable Auto Map for Auxiliary PE** is automatically set to No.

**Step 3**
From the **Enable Auto Map For Auxiliary PEs** drop-down list, choose Yes for the DPM to set the output actions for all the Auxiliary PEs to MAP when the **Output Mode** is set to Transcode. The **Enable Auto Fix for Collision** is automatically set to Yes. If the **Enable Fixed Table Output** is set to Yes, the output configuration for the auxiliary PEs is determined by the fixed output table options when you resynchronize the output channels and PIDs to match the input programs. The DPM resolves any output conflicts automatically, even if the **Enable Auto Fix for Collision** is set to No. This setting is for multi-stream units only.

**Step 4**
Apply your changes.

---

Setting up the Resynchronize All Option

**Step 1**
Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose **Transport Stream > ASI Output** or **MPEG over IP Output**, and refer to the **Auto Sync** area.
- Web GUI (multi-stream unit): From the D9800 web GUI, choose **Transport Stream > ASI 1 Output, ASI 2 Output, IP Data 1/Data 2 Output**, or **IP Data 3/Data 4 Output**, and refer to the **Auto Sync** area.
- Front Panel: From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > Options**, and choose the input you want to configure from the **Output** front panel menu.

**Step 2**
From the **Enable Fixed Output** drop-down list, or the **Fixed Output** front panel menu, choose Yes for the DPM to assign new values for all the output channels and PIDs according to the fixed output options defined, when you synchronize the inputs to the outputs according to the service assignments only (Resynchronize All).
Step 3  Click **Fixed Output Option**, or scroll the front panel menus to configure the fixed output options and click **OK**.

a) From the **Use Input Channel Numbers** drop-down list, or the **Use Imp Chan** front panel menu, choose Yes to use the output channel. Otherwise, choose No (default) to use the first or start channel and channel offset or step assigned below.

   - In the **First Channel Number** field, or the **Start** front panel menu, set the first PE channel number to use (from 1 to 65535). By default, the channel is set to 1.

   - In the **Channel Numbers Offset** field, or the **Step** front panel menu, set the subsequent PE channel numbers (from 1 to 65535). For example, if the **First Channel Number** is set to 100 and the Channel Numbers Offset is set to 10, then the first channel number is 100, and the second channel number is 110.

b) From the **Use Input PMT PID Numbers** drop-down list, or the **Use Inp PMT** front panel menu, choose Yes to use the input PMT PID number. Otherwise, choose No (default) to use the first or start PE PID number and PID offset or step number assigned below.

   - In the **First Channel First ES PID Number** field (or the **Start** front panel menu), enter the first PE PMT PID number (from 1 to 8192). The default is 1701.

   - In the **PMT PID Numbers Offset** field, or the **Step** front panel menu, set the offset of the subsequent PE PMT PID numbers (from 1 to 8192). For example, if the First Channel First ES PID Number is set to 1701 and the PMT PID Numbers Offset is set to 1, then the first PMT PID number is 1701, and the second PMT PID number is 1702.

c) From the **Use Input ES PID Numbers** drop-down list, or the **Use Inp PIDs** front panel menu, choose Yes to use the input ES PID number. Otherwise, choose No (default) to use the first or start ES PID number and the ES PID offset or step number assigned below.

   - In the **First Channel First ES PID Number** field, or the **Start** front panel menu, set the first ES PID number. The default is 101.

   - In the **First ES PID Numbers Offset** field, set the offset of the first ES PID of subsequent channel numbers. For example, if the First ES PID Number is set to 101 and the ES PID Numbers Offset is set to 100, then the first ES PID number is 101, and the second ES PID number is 201.

d) From the **Use Input PMT ES Stream Order** drop-down list, or the **Use Inp Ord** front panel menu, choose Yes to assign the ES PID according to the incoming PMT order. Otherwise, set to No to use the reserved PIDs defined below.

   - In the PCR, VID, AUD, SUBT, VBI, DPI, MPE, TTX, DATA, LSD, CDT, ETV fields or front panel menus, set the number of PIDs for the specified streams (PCR, VID, AUD, SUBT, VBI, DPI, MPE, TTX, DATA, LSD, CDT, ETV) in one channel (from 1 to 64).

Step 4  Apply your changes.

---

**Resolving Conflicts**

If a conflict occurs and the **Enable Auto Map for Collision** field, or the **Auto Map** front panel menu, is set to No, a detailed list of all the conflicts is displayed in the Output Channel and PID Conflicts table when you click **View Conflicts**. You can then resolve the conflicts manually.
If a conflict occurs and the **Enable Auto Map for Collision** field (or the Auto Map front panel menu) is set to Yes, a message that the conflicts will be fixed automatically and the Output Channel and PID Conflicts table is empty when you click **View Conflicts**.

Note

Any changes made to the ASI DPM values will automatically change the **Mode Status** to **Edited by User**.

- For channel conflicts, the system will only automatically change the duplicated output channel numbers. If both PE actions are set to Map, the output channel number of the higher PE is changed. Otherwise, the output channel number of the mapped PE is changed. The new channel number selected is the next channel number that does not appear in the current PAT or belong to any other PEs.

- For PID conflicts, the system will only automatically change the duplicated output PID numbers. If both PE actions are set to Map, the output PID number of the higher PE is changed. Otherwise, the output PID number of the mapped PE is changed. For example, if the PMT PID of PE1 matches the ES PID of PE2, the ES PID of PE2 is changed. The new PID number selected is the next number that does not appear in the output of any PE and it is not in the current transport input.

### Setting up the DPM Program Entries

The DPM feature allows you to groom functionality on a program basis, where individual service PID modifications are provided on a limited scale. Use the digital program mapping feature to:

- configure the transport output bit rate.
- configure the output mode for a program entry.
- configure the service and PID output settings in a program entry.

This section defines all the available fields. For an example of a typical setup of the DPM, see Typical Digital Program Mapping Setup, on page 14.

### Configuring DPM General Settings

**Step 1**

Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose **Transport Stream > Digital Program Mapping** for ASI or MPEG over IP output, and refer to the **DPM General Settings** area.
- Front Panel (single-stream unit): From the D9800 front panel, choose **Setup > Outputs > TS Out > DPM > ASI or MOIP**.
- Web GUI (multi-stream unit): From the D9800 web GUI, choose **Transport Stream > Digital Program Mapping** for ASI 1 Output, ASI 2 Output, IP Data 1/Data 2 Output, or IP Data 3/Data 4 Output, and refer to the **DPM General Settings** area.
- Front Panel (multi-stream unit): from the D9800 front panel, choose **Setup > Outputs > TS Out > DPM > ASI1, ASI2, IP1/2, or IP3/4**.

**Step 2**

From the **Remapping Mode** drop-down list, or the **Map Mode** front panel menu, choose the DPM mapping mode for this output.
• Svc ID - The elementary PIDs are not changed. Channels are remapped by changing their PSI references. When this mode is selected, PE detailed PID mapping in the PD menu are ignored.
• Svc ID & PID - Channels and the elementary service PIDs can be mapped in the DPM PE PID MAP window.

If you use this mode, you must choose how to handle duplicate programs from the Duplication Method drop-down list, or the Duplic Mode front panel menu:

• PSI Remap - Every input PID can be mapped to only one output PID. If PID mapping conflicts exist, DPM will use the Precedence Rule to decide which output PID to use. All PMTs using the input PID will be updated to reference the output PID specified by the winner.
• Pkt Copy - An input PID can be mapped to multiple output PIDs. The PID will be duplicated as many times as needed (up to a certain hardware limitation). Pkt Copy is recommended for most applications.

Note This may increase the output bandwidth of the stream.

**Step 3**

From the Unreferenced Content drop-down list, or the Unref front panel menu, choose the action to use for unreferenced content. Unreferenced content is the remainder of the transport stream that is not filtered by the program entries. Choose Drop (default) to drop all unreferenced content. Choose Pass to pass all unreferenced content to the output unchanged. For multi-stream units only, choose Mode-i to use a customer-specific mode. Click Mode-i Options, or choose PAT/PMT Offset and NIT Offset front panel menus, to set the PAT Offset and NIT Plus Offset information. This is only used if directed by Cisco. For more information, contact Cisco Services.

Note Mode-i is not supported in multi input mode. If you switch to multi input mode by adding a second active input, the unreferenced content will drop.

**Step 4**

From the Service ID Output drop-down list, or the Service ID front panel menu, choose whether the transcoder should always generate PSI tables for the Mapped PE even if the selected input channel is not available, or for only valid service channels/IDs. The following describes each service ID:

• Valid Ch - Only transmits the PSI tables for the mapped program if the program exists on the input stream.
• All Ch - Transmits the PSI tables for the mapped program even if the program does not exist in the input stream.

All Ch is only valid if the PAT, NIT, SDT and PMT are set to Regenerate.

**Step 5**

Apply the changes.

---

**Setting the PSI Table Options**

**Step 1**

Do one of the following:

• Web GUI (single-stream only): From the D9800 web GUI, choose Transport Stream > Digital Program Mapping for ASI, MPEG over IP output, and refer to the DPM General Settings area.
• Front Panel (single-stream only): From the D9800 front panel, choose Setup > Outputs > TS Out > DPM > ASI or MOIP.
• Web GUI (multi-stream only): From the D9800 web GUI, choose Transport Stream > Digital Program Mapping for ASI 1 Output, ASI 2 Output, IP Data 1/2 Data 2 Output, or IP Data 3/4 Data 4 Output, and refer to the DPM General Settings area.
• Front Panel (multi-stream only): From the D9800 front panel, choose Setup > Outputs > TS Out > DPM > ASI1, ASI2, IP1/2, or IP3/4.
Step 2  From the **PSI Table Output Option** drop-down list, or the **PSI Options** front panel menu, choose the action to perform on the PSI tables for the output stream. The following describes each option:

- **Pass All** - Transmits the incoming PSI tables as is; does not modify the content and rate. The SI Regeneration Option (or the PSI Rate front panel menu) and table settings are ignored.
- **Drop All** - Does not transmit any PSI tables. The SI Regeneration Option and table settings are ignored.
- **Ctl By Table** - The incoming PSI tables are transmitted, according to the output mode set in the table options (see Step b below). You must set the following:

  1. From the **SI Regeneration Option** drop-down list, or the **PSI Rate** front panel menu, choose the regeneration rate for the PSI tables being regenerated. The following describes each PSI rate:
     - **Auto** - Matches the generated PSI tables’ output rate to the incoming rate.
     - **MPEG Min** - Transmits the generated PSI tables on the longest intervals that are allowed by MPEG standard.
     - **SA Std** - Transmits the generated PSI tables based on PowerVu standard intervals.

  2. Click **Table Options**, or scroll down the front panel menu to choose the table specific output mode for each table. From each of the table drop-down lists, choose pass, drop, regenerate (Regen), or pass with rate control (PwRC) and click **OK**.

**Note**  For the front panel, the table menus (PAT, CAT, PMT, TSDT, NIT, NITO, SDT, SDTO, BAT EIT, TDT, RST, TOT, DIT, SIT, EMC, EMM, DRT, CDT) will only appear if you choose **Ctl by Table**.

**Note**  The CDT is different from the other tables listed because the CDT is referred to within the PMT, rather than outside the PMT. Check the **Block CDT Output** check box (or choose Pass from the **CDT** front panel menu) to override the DPM PID map configuration for CDT PIDs and to always drop all CDTs. Otherwise, uncheck the **Block CDT Output** (or choose Drop from the **CDT** front panel menu) to permit the output of CDTs following the configured DPM PID map configuration and all other DPM constraints.

Step 3  From the **PSI Regeneration Option** drop-down list, or the **Setup > Outputs > TS Out > DPM > Global > Regenerate** front panel menu, choose whether to regenerate the PSI tables in the output. Choose **Always** to regenerate all the tables or choose **As Needed** to only regenerate the tables if the content has changed.

Step 4  Apply the changes.

---

**Typical Digital Program Mapping Setup**

**Step 1**  Verify that you are receiving a valid signal and that you have set up the channels that you want to pass, drop, or map.

**Step 2**  Set the following output parameters:

- **Output Mode** - Map Service Channels Only.
- **Descrambled** - Scrambled or descrambled for downstream viewing or monitoring.

For more information, see Configuring the ASI or MPEGoIP Output General Settings, on page 3.

**Step 3**  From the ASI, MPEG over IP, or IP Digital Program Mapping page:

- Click **Resynchronize All** or choose the **Resync All** from the Global front panel menu.
- Edit a program entry in the **DPM Program Entry Setup** area and add a new record.
Step 4 Set the following DPM general settings:

- Remapping Mode or Map Mode - Svc ID & PID
- Duplication Method or Duplic Mode - Pkt Copy
- Unreferenced Content or Unref - Drop
- Service ID Output or Svc ID - Valid Ch or All Ch
- PSI Output Option or PSI Options - Ctrl By Table
- PSI Regeneration Option or PSI Rate - Always or As Needed

For more information, see Configuring DPM General Settings, on page 12.

Step 5 Set the following table options:

- PAT, CAT, PMT, SDT - Regen
- TSDT, NITO, SDTO, BAT, EIT, ECM, EMM, DRT, CDT - Drop
- TDT, RST, TOT, DIT, SIT - Pass
- NIT - Regen or Drop

For more information, see Setting the PSI Table Options, on page 13.

Step 6 Apply the changes.

Copying between ASI and MPEGoIP DPM Settings

Step 1 Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose Transport Stream > Digital Program Mapping for ASI or MPEG over IP output.
- Front Panel: From the D9800 front panel, choose Setup > Outputs > TS Out > DPM > Global.

Step 2 For a single-stream unit, do one of the following:

- Click Copy To MOIP, or choose the Copy: > ASI->MOIP front panel menu, to copy all the DPM data from the ASI output to the MOIP output.
- Click Copy To ASI, or choose the MOIP->ASI front panel menu, to copy all the DPM data from the MOIP output to the ASI output.

For a multi-stream unit, do one of the following:

- Web GUI: Click Copy and check the output check boxes to copy all the DPM data from the output displayed in the From field, to the outputs selected in the To field. Click Apply.
Configuring the Program Entries

**Step 1**  Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose **Transport Stream > Digital Program Mapping** for ASI or MPEGoIP.
- Front Panel (single-stream unit): From the D9800 front panel, choose **Setup > Outputs > TS Out > DPM > ASI** or **MOIP**
- Front Panel (multi-stream unit): From the D9800 front panel, choose **Setup > Outputs > TS Out > DPM > ASI1, ASI2, IP1/2, or IP3/4**.

The DPM **Program Entry Setup** area displays a list of DPM program entries in the **Program Entry** column, or the **PE** menu. There are 16 channels for single-stream units, and 32 channels for multi-stream units. Each program entry displays the input channel number in the **Chl #** column, or the **InCh** front panel menu, and the channel name in the **Name** column.

On a multi-stream unit, depending on the number of transcoder boards installed, the unit can have up to 16 auxiliary channels (PE1A to PE16A). For example, if there is one transcoder board, there are 8 auxiliary channels, and if there are two transcoder boards, there are 16 auxiliary channels. For more information on viewing the number of transcoder boards installed, see the number of **D9800-TXB** entries listed in the **HW Board Versions** area (**System Settings > System**). The auxiliary channels automatically tune to the corresponding PE channels. If the main PE is not transcoding, the auxiliary PE is dropped.

**Step 2**  Click the program entry you want to edit, or choose the program entry from the **PE** front panel menu.

**Step 3**  On a multi-stream unit, choose the input you want to assign to the program entry from the **Input Name** drop-down list. On a single-stream unit, the **Input Name** column displays the input used (RF, ASI, or MOIP). You can also set this on the Channel Selection page. For more information, see **Assigning a Channel to a Program Entry**.

**Step 4**  From the **Channel** drop-down list, choose or enter the channel number of the current program entry. You can also set this on the Channel Selection page. For more information, see **Assigning a Channel to a Program Entry**. The channel is displayed in the **InCh** front panel menu.

**Step 5**  From the **Action** column, or the **Act** front panel menu, choose the action to perform on the current program entry. This setting controls the overall DPM behavior of the program entry and affects how the PID mapping operates.

- **Pass** (default) - The output channel is the same as the input channel. The **Output Chl #** and **PMT PID** settings (**OutCh** and **PMT** front panel menus) are ignored. All PID map entries are ignored except for entries that explicitly drop a service.
- **Map** - The output channel is mapped to the **Output Chl #** and **PMT PID** (**OutCh** and **PMT** front panel menu) settings. Only services which have entries in the PID map are available on the output. These services will appear in the PMT even if the stream is not present. To edit the channel number and PMT PID that will be mapped to the input channel or PMT PID, click the radio button of the program entry and click **Edit**. For more information, see **Mapping the Program PIDs**, on page 17. If the PE is mapped, it uses the last valid input. The output map (for example, output channel PMT) does not change automatically if the input or channel number is changed.
• Drop - The current channel is not sent to the output and its PMT is removed from the output. The OutCh, PMT, and PID map entries are ignored.
• XCode (multi-stream units only) - Provides the flexibility to define all the outgoing PID numbers for a PE, including those not currently on transmission, as in Map mode, plus the video PID is transcoded to output at the rate and settings defined for the transcoding channel. The Auxiliary Programs (P1A to P16A) cannot be set to XCode. Also, they are automatically dropped when the corresponding Main PE is not transcoding.

Step 6   Click **Save** or press **Apply** on the front panel.

---

### Configuring Auxiliary Program Entries

You can only configure auxiliary program entries on a multi-stream unit.

**Step 1**   Ensure that the **Enable Auto Map For Auxiliary PEs** drop-down list is set to **Yes**. For more information, see **Setting up the Auto Synchronization Options**, on page 10.

**Step 2**   From the D9800 web GUI, choose **Transport Stream > Digital Program Mapping** for ASI 1, ASI 2, IP Data 1/Data 2, or IP Data 3/Data 4. Or, from the D9800 front panel, choose **Setup > Outputs > TS Out > DPM > ASI1, ASI2, IP1/2, or IP3/4**.

**Step 3**   Click a PxA to edit or choose a PxA from the PE front panel menu.

**Step 4**   Choose **Map** from the **Action** drop-down list, or the **Act** front panel menu. For more information on the Action parameter, see **Configuring the Program Entries**, on page 16.

**Step 5**   Save your changes.

**Step 6**   Click **Resynchronize All** or choose **Resync: All** front panel menu to ensure that the inputs and outputs are the same.

---

### Mapping the Program PIDs

The PID mapping feature allows you to map input services to output PIDs. If the PE Action is **Pass**, or the PE Action is **Map** and the Remapping Mode is set to **Svc ID**, only entries which drop a service are applied and all other services are passed through. If the PE action is **Map** and **Map Mode** is **Svc ID & PID**, all entries are applied. Any services not mapped by an entry will be dropped.

For the front panel, press up and down to scroll through the PID map entries. Press ADV to insert or delete entries from the PID map. After inserting an entry, specify the service using OutType and In, and set the desired Action. If the action is **Map**, select the output PID value as well. Then press **APPLY** and save the settings to see the selected input service that will follow that mapping.

**Step 1**   Do one of the following:

- **Web GUI (single-stream unit):** From the D9800 web GUI, choose **Transport Stream > Digital Program Mapping** for ASI or MPEG over IP output.
- **Front Panel (single-stream unit):** From the D9800 front panel, choose **Setup > Outputs > TS Out > DPM > ASI** or **MOIP**.
- **Web GUI (multi-stream unit):** From the D9800 web GUI, choose **Transport Stream > Digital Program Mapping** for ASI 1 Output, ASI 2 Output, IP Data 1/Data 2 Output, or IP Data 3/Data 4 Output.
- Front Panel (single-stream unit): from the D9800 front panel, choose Setup > Outputs > TS Out > DPM > ASI1, ASI2, IP1/2, or IP3/4.

**Step 2**
Click the program entry radio button you want to map the PIDs and click Edit or choose the program entry from the PE front panel menu.

**Step 3**
In the Output Channel # field, or the OutCh front panel menu, enter the output channel number you want to map to the input channel (displayed in the Input Channel # field or the InCh front panel menu). This value is only used if the PE Action is set to Map. You can enter a range from 1 to 65535.

**Step 4**
In the Output PMT PID field, or the second PMT front panel menu, enter the output PMT PID number you want to map to the input PMT PID (displayed in the Input PMT PID field or the first PMT front panel menu). This value is only used if the PE Action is set to Map. You can enter a range from 2 to 8190.

**Step 5**
For front panel only, choose the PID menu to map the program PIDs.

**Step 6**
You can click on the radio button of an existing PID mapping entry you want to modify or click the + button to insert a new PID mapping. If there is no record available on the front panel, choose Yes to insert a new record.

The Input Stream, or the ITyp front panel menu, indicates the input service that will be mapped by the current entry. The Input PID, or the PID front panel menu, displays the input PID (1 to 8190) that will be mapped by the current entry. This is only used if Action is set to Map.

**Step 7**
From the Action drop-down list, or the Act front panel menu, choose the action to perform on the current PID. The Drop action is always performed, but the Map option is only applied if the PE Action is Map and the Remapping Mode is Svc ID & PID in the DPM General Settings section.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop</td>
<td>The service selected by the Category and Instance will be mapped to the specified PID. This is only applied if the PE action is Map and the Remapping Mode is Svc ID &amp; PID.</td>
</tr>
<tr>
<td>Map</td>
<td>The service selected by the Category and Instance will be removed from the PMT and the output stream.</td>
</tr>
</tbody>
</table>

**Step 8**
If the Action, or the Act front panel menu, is set to Map, enter the output PID number (0 to 8192) in the Output PID field, or the PID front panel menu.

**Step 9**
In the Stream Type field, or the StTyp front panel menu, enter a stream type to map within a PE to a specified PID (0 to 255).

**Step 10**
From the Category drop-down list, or the OTyp front panel menu, choose the service to configure. If an input service matches this type and Instance, then the Action will be applied. This value is only used if Action is set to Map.

**Step 11**
In the Instance field, or the In front panel menu, enter the instance of the service specified by Category to configure (1 to 64). If an input service matches this type and instance, then the Action will be applied.

**Step 12**
Click Save, and then click OK.

**Step 13**
Apply the changes.

---

**Setting the SAP IP Address**

**Step 1**
Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose Transport Stream > MPEG over IP Output.
• Front Panel (single-stream unit): From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > MOIP > MOIP Streams.**
• Web GUI (multi-stream unit): From the D9800 web GUI, choose **Transport Stream > IP Data 1/Data 2 Output or Data 3/Data 4 Output.**
• Front Panel (multi-stream unit): From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > IP > Streams Configuration.**

**Step 2**

In the **SAP Multicast IP Address** field, or the **SAP Address** front panel menu, set the Session Announcement Protocol (SAP) destination IP address. This is the IP address where the SAP announcements are sent, if required.

**Note**  We recommend that you do not change the default IP address (224.2.127.254).

**Step 3**

In the **SAP Destination UDP Port** field or **SAP Port** front panel menu, set the SAP destination port number (1 to 65534). This is the UDP port where the SAP announcements are sent, if required.

**Note**  We recommend that you do not change the default SAP port of 9875.

**Step 4**

Apply the changes.

The front panel has the following additional settings:

- Send SAP - Select whether to send Session Announcement Protocol messages (None or RFC2327).
- SAP ID - Choose the SAP output stream name source (User String or SDT Channel).
- SAP User Str - Enter the SAP user string, up to 31 characters.

---

### Setting the Transport Packet Limits

**Step 1**

Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose **Transport Stream > MPEG over IP Output.**
- Front Panel (single-stream unit): From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > MOIP > MOIP Streams.**
- Web GUI (multi-stream unit): From the D9800 web GUI, choose **Transport Stream > IP Data 1/Data 2 or IP Data 3/Data 4 Output.**
- Front Panel (multi-stream unit): From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > IP > Streams Configuration.**

**Step 2**

In the **Maximum Transport Packets/Ethernet Frame** field, or the **TS/IP** front panel menu, enter or choose the maximum number of transport packets per IP packet (1 to 7).

**Step 3**

In the **Minimum number Packets/Second** field, or the **Min IP/s** front panel menu, enter or choose the minimum number of transport packets per IP packet (0 or 2 to 1000).
Configuring the Forward Error Correction Settings

Due to the nature of an IP network (occasionally packet loss, packet reordering, and/or stream jitter) it is not the perfect channel for transmitting broadcast-quality compressed video content. Forward Error Correction (FEC) developed by the Pro-MPEG forum is a unique technology to enhance the robustness of video traffic over IP networks. The D9800 receiver supports Pro-MPEG FEC Code of Practice (COP) #3 release 2 and SMPTE-2022, which is based on the exclusive or (XOR) boolean operator applied to a number of data packets. When a FEC packet is created by performing the XOR boolean operation on a number of RTP packets, a missing RTP packet can always be reconstructed by performing the XOR operation on the FEC packet and the remaining RTP packets.

\[
\begin{align*}
FEC &= RTP1 \ XOR \ RTP2 \\
RTP1 &= FEC \ XOR \ RTP2 \\
RTP2 &= FEC \ XOR \ RTP1
\end{align*}
\]

**Step 1**
Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose Transport Stream > MPEG over IP Output > Stream tab.
- Front Panel (single-stream unit): From the Main Menu of the D9800 front panel, choose Setup > Outputs > TS Out > MOIP > MOIP Streams.
- Front Panel (multi-stream unit): From the Main Menu of the D9800 front panel, choose Setup > Outputs > TS Out > IP > Streams Configuration.

**Step 2**
Click the radio button of the stream you want to configure FEC settings, or choose the ID front panel menu and choose the stream.

**Step 3**
Click FEC.

**Step 4**
From the FEC Mode drop-down list, or the FEC front panel menu, choose an error protection profile.

- Choose 1D to use the 1D FEC profile. The 1D FEC profile maps the RTP packet stream across columns (matrix of data packets). The following is an example:
• Choose **2D** to use the 2D FEC profile. The 2D FEC profile maps the RTP packet stream across both the column packets and row packets. In the following example, a FEC packet is created for each row and each column:

• Choose **None** to disable the error protection for the MPEGoIP stream.

**Step 5**

The generation of the FEC packets is based on the use of a matrix. The matrix size is defined by the Length (L) and Depth (D) parameters. In the **FEC Columns (L)** field or front panel menu, set the spacing between non-consecutive packets used to calculate the FEC packet (1 to 20).

If the FEC Mode or the FEC front panel menu is set to 2D, set the depth of the matrix in the **FEC Rows (D)** field or front panel menu (4 to 20).

If the **FEC Mode** or the **FEC** front panel menu is set to 2D, set the depth of the matrix in the **FEC Rows (D)** field or front panel menu (4 to 20).
For additional restrictions on L and D values (depending on the FEC Scheme and FEC Mode), refer to Pro-MPEG FEC COP#3 and SMPTE-2022.

**Step 6**  
In the **FEC Columns UDP Port** field, or the **FEC1 UDP** front panel menu, enter the UDP port number for the FEC Columns stream (2 to 65534, even number only). We recommend that you set the port number to TS UDP port + 2. If the FEC Mode or the FEC front panel menu is set to 2D, enter the destination UDP port number for the FEC Rows stream in the **FEC Rows UDP Port** field (or the **FEC2 UDP** front panel menu). The range is from 2 to 65534, even number only. We recommend that you set the port number to TS UDP port + 4.

**Step 7**  
Click **OK** and apply the changes.

---

## Configuring MPEG over IP or IP Data Streams

**Step 1**  
Do one of the following:

- **Web GUI** (single-stream unit): From the D9800 web GUI, choose **Transport Stream > MPEG over IP Output > Stream** tab.
- **Front Panel** (single-stream unit): From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > MOIP > MOIP Streams**.
- **Web GUI** (multi-stream unit): From the D9800 web GUI, choose **Transport Stream > IP Data 1/Data 2 or IP Data 3/Data 4 Output > Stream** tab.
- **Front Panel** (multi-stream unit): From the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > IP > Streams Configuration**.

**Step 2**  
Double-click the stream you want to edit, or from the **ID** front panel menu, choose the stream you want to edit. A single-stream unit has up to 16 streams, and a multi-stream unit has up to 32 streams.

If the **Output Mode** is set to No Output, Passthrough, Service Channels Only, MAP Passthrough, MAP Service Channels Only, or Transcoding, you can configure the Multi Program Transport Stream (MPTS). PE2 to PE16 or PE32 are not applicable.

If the **Output Mode** is set to SPTS Service Channels Only, SPTS MAP Service Channels Only, or SPTS Transcoding, you can configure PE1 to PE16 or PE32 streams. Each PE creates its own transport stream for the assigned service channel and ES PIDs.

**Step 3**  
From the **Bitrate** field, or the **User Rate** front panel menu, enter the output rate of the transport stream, in Mbps.

**Step 4**  
From the **Encapsulation** drop-down list, or the **MOIP** front panel menu, choose the transport protocol to use for the output stream (UDP or RTP).

**Step 5**  
In the **Destination IP** field, or the **DestAddr** front panel menu, enter the unicast (valid host IP only) or multicast destination IP address.

**Step 6**  
In the **Destination UDP Port** field, or the **UDPPort** front panel menu, choose the destination port number (1024 to 65534).

**Step 7**  
Apply the changes.
Configuring Advanced MPEG over IP or IP Data Stream Settings

Step 1  Do one of the following:

- Web GUI (single-stream unit): From the D9800 web GUI, choose Transport Stream > MPEG over IP Output > Stream tab.
- Front Panel (single-stream unit): From the Main Menu of the D9800 front panel, choose Setup > Outputs > TS Out > MOIP > MOIP Streams.
- Front Panel (multi-stream unit): From the Main Menu of the D9800 front panel, choose Setup > Outputs > TS Out > IP > Stream Configuration.

Step 2  Click the radio button of the stream you want to configure advanced settings and click Advanced, or from the ID front panel menu, choose the stream you want to edit. A single-stream unit has up to 16 streams, and a multi-stream unit has up to 32 streams.

Step 3  In the Traffic Class field, or the TOS front panel menu, enter the quality of service (0 to 255).

Step 4  In the Time to Live (Max #hops) field, or the TTL front panel menu, enter the hop limit of the packet's lifespan (0 to 255).

Step 5  In the Source UDP Port field, or the SrcPort front panel menu, enter the source UDP port number (0 to 65535).

Note  Set the Source UDP Port to 0 to use the default UDP port (49162).

Step 6  From the Announce Type drop-down list, or the Send SAP front panel menu, choose RFC 2327 to send the Session Announcement Protocol (SAP) messages according to the RFC 2327 standard. Otherwise, choose None to not send SAP messages.

Step 7  From the Announce Title Source drop-down list, or the SAP ID front panel menu, choose User String to use the SAP string as the channel name, defined in the Announce User's Title below. Otherwise, choose SDT Channel to use the SDT string as the channel name.

Step 8  In the Announce User's Title field, or the SAP User Str front panel menu, enter the SAP identifier or string (up to 31 characters), if the Announce Title Source or SAP ID front panel is set to User String.

Step 9  Apply the changes.

Configuring the Transcoder Settings

The Transcoder Setup page is available on multi-stream units only. The transcode feature, with the appropriate licenses, allows you to convert MPEG-4 HD services to MPEG-2, for use in CATV headends. The HEVC processor feature, with the appropriate license, allows you to convert HEVC or H.265 services to MPEG-2. For more information on licenses, see Viewing Hardware Features and Software License Information.

Step 1  From the D9800 web GUI, choose Transport Stream > Transcoder Setup. Or, from the Main Menu of the D9800 front panel, choose Setup > Outputs > TS Out > Transcode > Transcode.

Step 2  From the Action on Loss of Input drop-down list, or the LOI Action front panel menu, choose the action the transcoder takes when there is a loss of input signal (No Output or Black Output).
**Step 3**  
From **Transcoder 1 Output** to **Transcoder 16 Output** drop-down lists, choose the video format of the transcoded output. The number of transcoder outputs depends on the transcoding licenses available. Or, from the **PE** front panel menu, choose the transcoder index, as referenced by the DPM, and then choose the video format of the transcoded output from the **Video Mode** front panel menu. The table below describes the options.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>The input video format and resolution remains unchanged during transcoding. For example, if the input video format is SD, the output video format is also SD.</td>
</tr>
<tr>
<td>SD Output</td>
<td>The video down-converts from HD to SD when an HD input signal is received. The SD horizontal resolution will follow the SD HRes parameter set in transcoder settings. For more information on transcoder settings, see Configuring the HD and SD Transcode Settings, on page 24.</td>
</tr>
<tr>
<td>HD Output</td>
<td>The input video up-converts from SD to HD 1080i when receiving an SD input signal. The HD horizontal resolution will follow the HD HRes parameter, set in transcoder settings. For more information on transcoder settings, see Configuring the HD and SD Transcode Settings, on page 24.</td>
</tr>
</tbody>
</table>

**Step 4**  
Apply your changes.

The **Remaining HD Transcoders** field displays the remaining HD licenses available to transcode on the unit. The number of resources available is updated automatically when you choose the transcoder output. Choosing Auto or HD Output decreases the HD license count by one.

---

**Setting up Transcoding**  
This is for multi-stream units only (D9800-MS-MPEGOIP).

**Step 1**  
Verify that you are receiving a valid signal and that you have set up the channels that you want to transcode.

**Step 2**  
Set the **ASI and/or IP Data Output Mode** to Transcoding. You will be prompted to Resync All for the selected output. This resynchronizes the inputs to outputs for the current PMT according to the service assignments and the PIDs for the program entry. For more information, see Configuring the ASI or MPEGoIP Output Mode, on page 4.

**Step 3**  
Save your changes. If the changes cannot be saved, an error message is displayed.

**Note**  
When remapping an input program channel to an output program channel, ensure that the PIDs are mapped to different PIDs to avoid PID collisions.

**Step 4**  
If desired, set a program channel for the second transcoder channel (PE2) and repeat Step 2, depending on the transcoding licenses. For more information on assigning a program channel to a PE, see Assigning a Channel to a Program Entry.

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**Configuring the HD and SD Transcode Settings**

**Step 1**  
From the D9800 web GUI, choose **Transport Stream > Transcoder Setup**. Or, from the Main Menu of the D9800 front panel, choose **Setup > Outputs > TS Out > Transcode**.
**Step 2**  
Click the Transcoder <#> Output radio button to select the channel you want to configure, and click Transcoder Config. Or, from the PE front panel menu, choose the program entry index, as referenced by the DPM. The <#> indicates the transcoder number (1 to 8 or 1 to 16, depending on the number of transcoders licensed).

**Step 3**  
On the web GUI, if the selected channel is set to HD Output, set the following in the HD Settings column. If the selected channel is set to SD Output, set the following in the SD Settings column.

a) From the HRes drop-down list, or the HD HRes or SD HRes front panel menu, choose the transcode channel HD or SD horizontal output video resolution. The table below displays the HD settings and resolutions.

<table>
<thead>
<tr>
<th>HD HRes Setting</th>
<th>Input Resolution</th>
<th>Output Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full</td>
<td>1080i, 1080p</td>
<td>1920</td>
</tr>
<tr>
<td></td>
<td>720p</td>
<td>1280</td>
</tr>
<tr>
<td>3/4</td>
<td>1080i, 1080p</td>
<td>1440</td>
</tr>
<tr>
<td></td>
<td>720p</td>
<td>960</td>
</tr>
</tbody>
</table>

b) From the Bitrate Mode drop-down list, or the HD B/R Mode or SD B/R Mode front panel menu, choose the transcode channel output bit rate mode (VBR or CBR).

c) In the Rate field for HD Settings, or the HD Bitrate front panel menu, enter the transcode output bit rate when HD MPEG-4, AVC, or HEVC to HD MPEG-2 transcoding is selected. The range is from 8 to 25 Mb/s, in 400 b/s increments.

In the Rate field for SD Settings, or the SD Bitrate front panel menu, enter the transcode output bit rate when HD to SD transcoding is selected as the output channel (2 to 15 Mb/s, in 400 b/s increments).

d) From the GOP Control drop-down list, or the HD GOP Control or SD GOP Control front panel menu, choose the format when transcoding a Group Of Pictures (GOP). The options are User GOP (MN) or I Frame Sync.

If User GOP is set as the GOP Control, choose the transcode manual GOP format value from the User GOP drop-down list, or the HD User GOP (M N) or SD User GOP (MN) front panel menu. The transcoder attempts to reuse information from the encoded bit stream to improve the video quality of the transcoded stream. Amongst others, if the incoming GOP structure is similar to that of an MPEG-2, it will reuse the frame allocations from the incoming stream as long as GOP Control is set to I Frame Sync. If the downstream transcoder does not support altering GOP structures, set the GOP Control setting to User GOP (MN). This will also require the setting of the GOP structure which is given as two numbers, where the first is the length of the GOP and the second is the number of B-pictures per sub-GOP. The supported GOP structures are 1 0, 12 2, 15 2, 24 2, and 30 2.

e) From the 3:2 Pull Down drop-down list, or HD 3:2 Pulldown or SD 3:2 Pulldown front panel menu, choose to enable or disable the 3:2 pulldown.

**Step 4**  
If you are configuring SD settings, the following are additional parameters, specific to SD only:

a) From the Output Aspect Ratio drop-down list, or the SD Aspect Ratio front panel menu, choose the aspect ratio for the SD transcode output channel. The options are 4:3 and 16:9 (wide aspect ratio).

b) From the Aspect Ratio Conversion drop-down list, or the SD AR Conv front panel menu, choose the SD transcode channel aspect ratio conversion. This is the conversion that the transcoder will perform on the output signal for the picture to be displayed correctly (for example, to correspond to the aspect ratio of your TV) on your TV, based on your selection.

c) From the Closed Caption Packet 1 and Closed Caption Packet 2 drop-down lists, or the CC Pkt 1 and CC Pkt 2 front panel menus, choose the order to output the closed caption packets on the transcoded SD output.
Inserting Subtitles to Transcoded Video

Step 1 From the D9800 web GUI, choose **Transport Stream > Transcoder Setup**.

Step 2 Click the radio button of the channel you want to insert subtitles to transcoded video (Transcoder 1, 2, 3, 4, 5, 6, 7, or 8 Output), and click **Subtitle Burn-In**.

Step 3 From the **Subtitle Control** drop-down list, choose the control to use to display the program subtitles. The table below describes the available options.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No subtitles are displayed.</td>
</tr>
<tr>
<td>On</td>
<td>Displays DVB or Imitext subtitles, if available.</td>
</tr>
<tr>
<td>DVB</td>
<td>Displays only DVB subtitles, if available. Otherwise, no subtitles are displayed.</td>
</tr>
<tr>
<td>Imitext</td>
<td>Displays only Imitext subtitles, if available. Otherwise, no subtitles are displayed.</td>
</tr>
</tbody>
</table>

Step 4 From the **Select By** drop-down list, choose the input source for the subtitle language. The default is Language List. Language Entry and PMT Order are more applicable for advanced applications.

- If Language List is selected as the input source, choose the MPEG language to display from the **Language List** drop-down list. The supported languages are according to ISO 639-2 Language Codes.
- If Language Entry is selected as the input source, enter the three-character code provided by your uplink service provider (for example, eng for English) in the **Manual Entry** field. The supported languages are according to ISO 639-2 Language Codes.
- If PMT is selected as the input source, choose the subtitle PID entry to display (First to Eighth) from the **PMT Order** drop-down list. This information is available from your uplink provider.

Step 5 From the **Imitext Position** drop-down list, choose the position of the on-screen subtitle text (Standard or Extended). This setting is only applicable if the Subtitle Control is set to On or Imitext.

Step 6 From the **Imitext Foreground Color** drop-down list, choose the color for Imitext subtitles. Auto displays text in the color transmitted by the subtitling equipment. Yellow and White overrides the color set by the uplink and display text in the selected color. This setting is only applicable if the Subtitle Control is set to On or Imitext.

Step 7 From the **Imitext Background Color** drop-down list, choose one of the following text background for Imitext subtitles:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>Uses the uplink subtitling equipment setting.</td>
</tr>
<tr>
<td>Shadow</td>
<td>Applies an outline to the right side of each text character. No background box is applied to subtitles, that is, text is visible directly on top of video.</td>
</tr>
<tr>
<td>Opaque</td>
<td>Applies a black box to each text character.</td>
</tr>
<tr>
<td>Semi</td>
<td>Applies a semi-transparent box to subtitle text.</td>
</tr>
<tr>
<td>None</td>
<td>No shadow or outline is applied to subtitle text.</td>
</tr>
</tbody>
</table>
This setting is only applicable if the **Subtitle Control** is set to On or Imitext.

**Step 8**  
Click **OK**.

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**Applying Inband Settings**

You can apply uplink parameters for transcoding (such as, bit rate, GOP, and resolution) to the local transcoder settings for the selected program entry. This is only supported with an uplink that uses uplink transcoding controls for the user address of the selected program entry.

**Step 1**  
From the D9800 web GUI, choose **Transport Stream > Transcoder Setup**, and click **Apply Inband Settings**. Or, from the main menu of the D9800 front panel, choose **Setup > Outputs > TS Out > Transcode > Inband**.

**Step 2**  
Check the transcoder/program entry check box that you want to apply uplink parameters, or choose the program entry from the **PE** front panel menu and then choose Yes or No from the **Apply Inband** front panel menu.

The disabled check box on the web GUI indicates that you do not have sufficient transcoder licenses.

**Step 3**  
Click **OK**.

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**Viewing the Transcoder Status**

The Transcoder status page is available on multi-stream units only (D9800-MS-MPEGOIP). It displays the input and output format and bit rates for all the transcoder outputs.
Viewing the Transcoder Status