FLEX 3000 / Flex 3500 Set Up Guide

Default IP Address on ETH 1: 192.168.1.205
Default UN: admin
Default PW: admin

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Note: This manual is being updated frequently. Please go to
http://www.d2dtechnologies.com/support/ to be certain that you have the latest copy.

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E. ASI TX: Output for sending ASI Transport Streams away from the unit.

2. D2 FLEX 3000 / 3500 Features
1. Base Model
The 3000 will simply send out whatever it receives in with no other functions available. All ASI programs in, get immediately sent to the IP Output. ALL IP in, will get sent to the ASI Output. All other menu items are erroneous.

To find out what features are enabled. Navigate to the [Features Page](#).

If you need to add any features, they can be added with a software upgrade. Contact your distributer or [D2D Technologies](#) for a quote.

1. **BASE Model - Flex 3000:**
   The D2 FLEX 3000 comes standard with ASI to IP and IP to ASI conversion that allows the transmission of SRT. (Secure Reliable Transport). SRT is an open source video transport protocol and technology stack that optimizes streaming performance across unpredictable networks.

2. **D2 FLEX 3500 Upgrade:**
   The 3500 Upgrade feature offers the ability to manipulate the VCT (Virtual Channel Tables), add or delete static PSIP. Change short names and major / minor channel numbers as well as add or delete minor channels. It will also allow you to send out the Transport Stream on both IP and ASI. Once upgraded, you can add the following features:

3. **D2 GUIDE - Dynamic PSIP, EPG insertion feature:**

The GUIDE feature provides the essential tools to create and maintain the Electronic Program Guide (EPG) tables and Program and System Information Protocol (PSIP) guide data for ATSC digital transport streams. The program guide information can be imported from a standard spreadsheet and is used by D2Guide to create the EIT tables necessary to meet FCC PSIP requirements. *(NOTE: In order for the GUIDE Feature to operate, the 3500 upgrade must be purchased and installed first)*

3. Connecting to the Flex

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2. D2 TCP/IP - Control Port Setup Guide

NOTE: The FLEX System is shipped with default, static IP addresses. You will need to have a direct Ethernet connection with the 3000 Chassis. The recommended way to achieve this is to set a stand-alone PC (Not on your LAN) with direct cable to the ETH 1 port.

You will need:
1. 1 Ethernet cable. (CAT 5 or CAT 6).
2. A PC (Windows or MAC) is set to a static IP address of 192.168.1.150 that has a wired Ethernet port and has either Chrome, Firefox or Microsoft edge.
3. 1 dedicated port and a dedicated static IP address from your IT or Network Facilities Administrator.

If you are NOT familiar with the process of changing your PC's IP settings, there are instructions here, or contact D2D Technologies support at: 904-323-4777 Option 2.

1. IP addresses and login info
The Flex 3000 default is 192.168.1.205. Login is admin/admin.

Plug a PC or Mac directly into the Ethernet port labeled **"ETHERNET"** on the back of the unit.

2. Default subnet: 192.168.1.150

Set your PC to the following parameters: IP address: 192.168.1.150,
Subnet Mask: 255.255.255.0, Gateway: 192.168.1.1.

The D2Flex runs the D2Manage web server used for configuration.
Use a web browser to connect to the control IP address of unit.
Default IP Address: 192.168.1.205

Default UN: admin
Default PW: admin

The following browsers are supported by the D2FLEX system:
Chrome
Firefox
Microsoft Edge
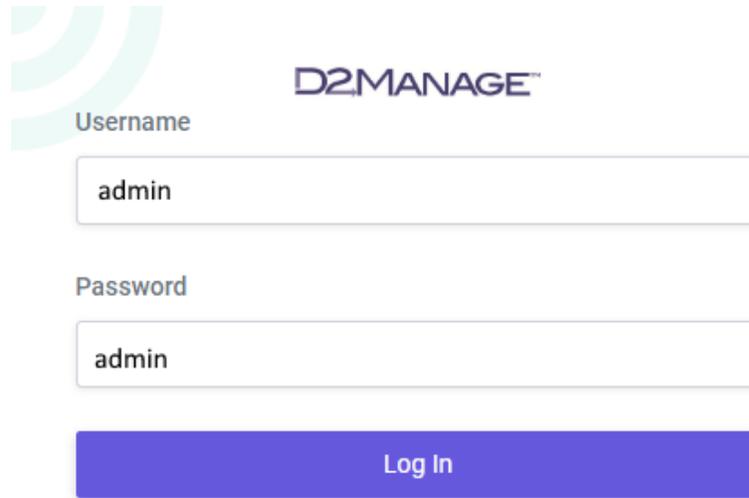
Once you type in the IP address, the username and password, you will land on the "System Status" Page.
This will display the temperatures of the main chip as the current temperature, the peak temperature, and
the "Uptime". (Amount of time that the board has been powered up).

Internal Temperature: 69.15 C ❓   Max Internal Temperature: 70.26 C ❓   Uptime: 0 Days 00:04:53

4. D2Manage Browser
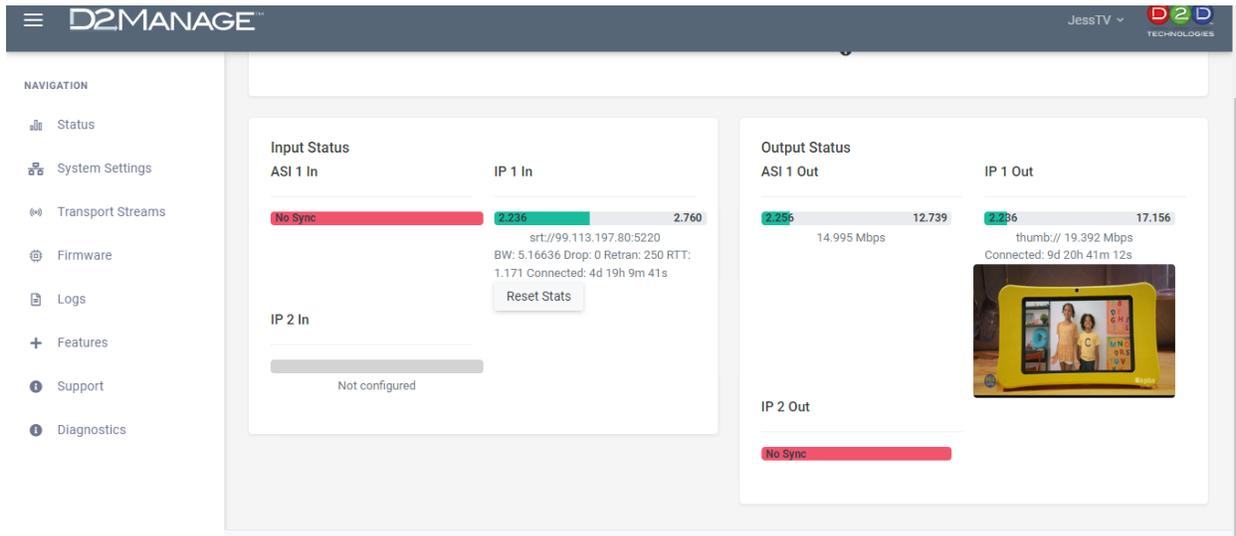
3. Input Status Tab

The status page lists the incoming payload data rate in green and the total aggregate data rate including null packets (Stuffing) in grey.   This allows for you to glance at the incoming signal for confidence.

4. SRT Stats

BW: The overall bandwidth needed to transmit the signal including overhead.
If this number is abnormally high as compared to the status bar bit rate, then the SRT needs extra bandwidth to retransmit packets due to network conditions.

Drop: The number of packets that have been dropped. These packets could not be delivered in time due to network conditions.

Retran: The number of packets that have been retransmitted due to network conditions. A low (or zero) value indicates good network conditions.

RTT: Round-Trip Time indicates the length of time (milliseconds) for a packet to traverse the network. This value can be used as a guide to set SRT latency to compensate for a high RTT.

Reset Stats: Reset statistics to zero.
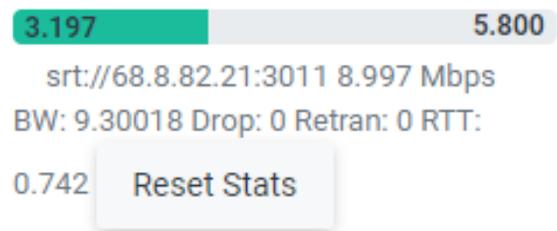
5. Changing the login / password settings

On the top righthand side of the screen, click on the "Admin"
Then click on Account Settings
Rename the login (If desired)
Retype in the password (admin)
Create a new password. letters, numbers and _-.,! only, case sensitive. 2
to 50 characters
NOTE: If you lock yourself out (IE: forget the login or passwords) contact D2 Care for "backdoor access" to reset the unit.
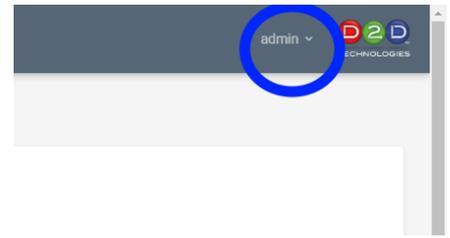
Account Settings   ✕

Login Username (letters, numbers and _-.,! only, case sensitive. 2 to 50 characters)

Current Password

New Password (letters, numbers and dollar sign only, case sensitive. Minimum length is 5 characters)

Confirm Password

Cancel   Save changes

6. Systems Settings Tab

1. System Gateway

Set this to the gateway of the LAN that allows the Flex 3000 to access external addresses.

2. Rear Panel Control IP Address

The IP address of the card for the Ethernet control plugged into the back of the unit.

3. Routes

Parameters for the IP route. Add static routes for access to addresses that are not available through the configured Gateway.

Routes ❓

Port 1	Address 1	Net Mask 1	Gateway 1	Status 1 ❓
Rear Panel ETH1 ▼	192.168.1.216	/32 (255.255.255.255) ▼	192.168.1.254	OK

Port 2	Address 2	Net Mask 2	Gateway 2	Status 2 ❓
▼		▼		

Apply Routes

7. General Settings

General Settings

Hostname ❓	DNS Server ❓	ASI Out Burst Mode ❓	Https ❓
FLEXyourMUX	8.8.4.4	Enabled	Disabled

IP Direct Output ❓	SSH Enable ❓
Disabled	Disabled

Save General Settings

Hostname: This box will allow you to set the name of the unit, so it shows up on the browser tab and other places. This makes it easier to navigate if you have multiple units. The default hostname is 'devicetype-serialnumber' (Eg: d2flex5k-123456). Valid characters are a-z (case insensitive) 0-9, hyphen(-)and dot(.) Unit must be restarted to apply the updated hostname. The default hostname can be re-generated by entering a blank name, then Save General Settings, and then Restart Unit.

DNS Server: In order for the unit to see the "Outside World", this needs to be set to a valid Domain Name Server.   If you do not have or know one, you can use Googles at 8.8.8.8 or, 8.8.4.4. If DHCP is enabled, this address will be checked first, followed by a check of the DHCP DNS address(es). Changing this value will reset DHCP network interfaces.

ASI Out Burst Mode: If enabled (default mode), all ASI outputs operate at full bandwidth (~213 MBPS). If disabled, all ASI outputs are constrained to ~53 MBPS. This option provides a compatibility mode for receivers that cannot accept a data byte on every ASI clock.

HTTPS: Requires System Reboot on change. Use 'https://nnn.nnn.nnn.nnn' or 'nnn.nnn.nnn.nnn:443' to access the user interface if the HTTPS option is enabled.
Please contact D2D Technologies support before enabling this option.

IP Direct Output: Please contact D2D Technologies support before enabling this option.

SSH Enable: Default is disabled. Please contact D2D Support for more information.

4. SNMP Settings

If you have local SNMP, you can set this to monitor the unit remotely. MIBS are located in the Support section of the D2Manage browser.

NOTE: If you are not using SNMP, these should always be set to a unique value that is not "public"or "private" to avoid any outside malicious activity.

SNMP Settings

rocommunity	rwcommunity	trapsink ❓	trapcommunity
Private	Private	localhost	Private

Save SNMP Settings

5. VPN Settings

Set this up if you use the unit on a private VPN.

6. RSSH Settings

RSSH or Restricted Secure Shell, allows you to access the browser of the unit from anywhere using our secure servers at monitor.d2dtechnologies.com. This allows you access to the device from anywhere that you have internet access.

7. To setup RSSH: Enable RSSH. Leave the Username, Server, Server SSH port as is.

The Remote Port should be the serial number of the unit. (Cross reference this in the Firmware Page). Take note of that serial number.

Local Port: 80 for the browser. 22 for FTP.
Status (Read Only) will say "Running" if it has been enabled. Default is "Stopped"
Save the RSSH Settings.
Check to see that "Stopped" turned to "Running".
Go to the URL listed as the server(monitor.d2dtechnologies.com) and type [:] [SerialNumber] after the .com.
Example: (If your serial number was 12345; ***http://monitor.d2dtechnologies.com:12345***
That should allow you complete access from anywhere.

Be certain that you absolutely change the Login and Password to the Unit. Otherwise, you are at risk because now this is on the outside world. If you do not want it on RSSH, just disable the function and it won't be accessible anymore.

NOTE: RSSH passwords are alphanumeric and !@#$%^&*_- only.

8. Time Settings
1. using the standard NTP (Network Time Protocol)
Accurate time settings are necessary for dynamic PSIP and are automatically set. The Flex automatically sets the time to **0.pool.ntp.org**, which is the main standard for Network Time Protocol in the United States. Set the time zone according to the geographical location of the unit.
 NOTE: If the NTP time settings are inaccurate, check your System Gateway and make certain it allows access to the "Outside World". The Diagnostic Tab has an option for verifying NTP Status. If your facility uses a master clock, add the IP address or URL. If the master clock is not available through your gateway, you may need to setup a route to point to it. A good generic NTP to use is: 0.pool.ntp.org.

2. Manually setting the time

Set the NTP Server IP to 0.0.0.0 and press "save Time Settings" and allow it to save. Then, you can set the time.

<	November ⌄ 2022	>

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	31	1	2	3	4	5
6	**7**	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3
4	5	6	7	8	9	10
01	:		37		PM	

Key File Present

false

Upload

Monday, 7 Nov 2022 13:37:48

NTP Server IP ❓

0.0.0.0

Timezone

Pacific ⬍

Save Time Settings

NOTE: If the bottom of the browser has a year of 1969, that means that the time is incorrect, and the unit is not seeing an NTP. This will affect the EPG (Dynamic PSIP) and the log files.

9. Transport Streams Tab

This is the page that is used to configure, mux and perform most operations regarding the streams.

1. Inputs and Outputs

All of the inputs available will be listed on this tab.

NOTE: If you have plugged in a valid ASI or TSoIP and see the bitrate status as green but do not see any services or a plus sign next to the input, press Rescan at the bottom to refresh the services.

Inputs

– ASI 1 In	⚙
CREATE	
– IP 1 In srt://99.113.197.80:5220	⚙
PBSKIDS	
IP 2 In (Not configured)	⚙

Outputs

– ASI 1 Out	⚙
PBSKIDS	⚙✕
CREATE	⚙✕
– IP 1 Out thumb://	⚙
PBSKIDS	⚙✕
+ IP 2 Out	⚙

Apply **Rescan**

The services are not refreshed automatically by the system, Rescan must be used to update the system if any inputs are changed.

The "Gear" at the end of an Input or an Output means it can be configured.
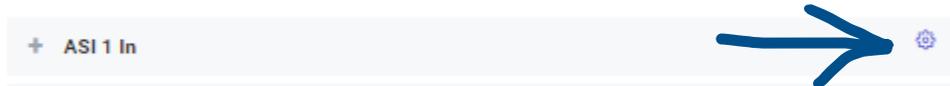
+ ASI 1 In	⚙

If you see a plus sign next to and ASI or IP Input, that means that it has parsed the stream and there are services inside.
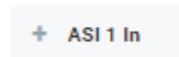
+ ASI 1 In

Click on the + sign to expand the services in the stream.

– ASI 1 In	⚙
KPBSHD	
KPBSH2	
CREATE	
PBSKIDS	

If you've just acquired, or acquiring a stream, press rescan. If you notice the Apply Pending button lit, you'll need to press that first. Any changes that have been made earlier will be taken effect once pressed.

Apply Pending   **Rescan**

2. Unreferenced PIDS

This will insert PIDS from another source into a particular stream. Most commonly used for SCTE triggers and Emergency Alert or WARN systems that need to pass or insert a PID that is not associated with another program.

UnReferenced Pids ❓

Input ❓	UnReferenced Pid (hex) ❓	Output ❓
ASI 1 In	911	ASI 1 Out
None		None
None		None
None		None

Apply Unreferenced Pids

3. Pass-Through Matrix

This mode will merely pass all the data through from a selected input to a selected output without any packet processing.   Most commonly used for ASI to TSoIP/SRT conversions.
==Leave this mode off you need to rebrand, add or change the stream in any way.==

Passthrough Matrix

Passthrough Matrix Mode ❓

Disabled

ASI 1 Out Source	ASI 2 Out Source	IP 1 Out Source	IP 2 Out Source	IP 3 Out Source	IP 4 Out Source
IP 1 In	None	ASI 1 In	None	None	None

IP 5 Out Source	IP 6 Out Source	IP 7 Out Source	IP 8 Out Source
None	None	None	None

Save Passthrough Settings

This example shows the ASI source out is directly coming in from the IP 1 In. And the IP 1 Out Source is coming directly out of the ASI In.

4. Inserting and multiplexing ASI

Once a valid ASI stream is inserted into the backplane, it should show up on the status of the screen for the appropriate ASI.
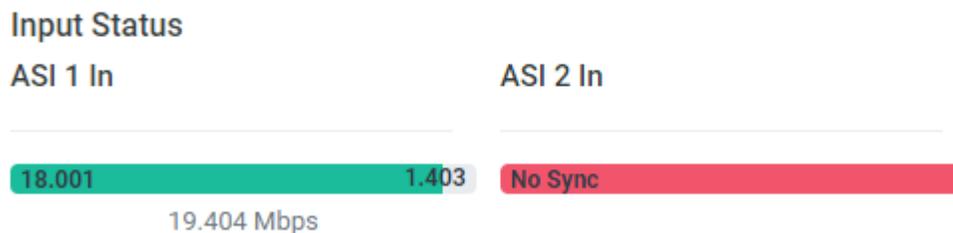
Input Status

ASI 1 In   ASI 2 In

18.001	1.403	No Sync

19.404 Mbps

On the Transport Streams Page, you can click on the plus sign, expand it and drag any of the services (or all) to any output.   In this case, one service is being sent out to the ASI 1 Out.
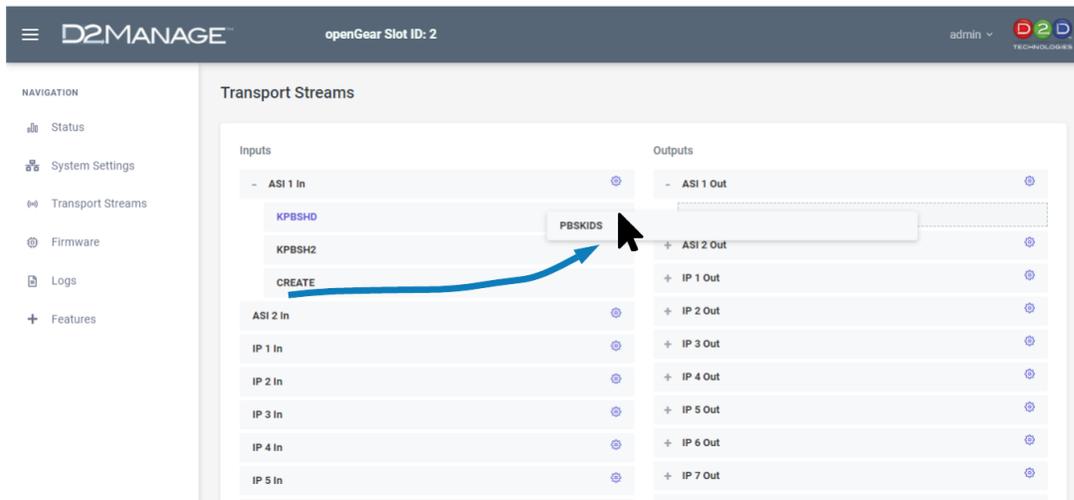
At that point, some data should show up on the output you dragged it to.
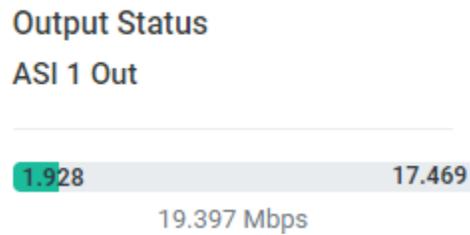
5. Configuring the ASI Out

You can edit the total output aggregate rate. This will stuff or add null packets as needed to fill to the needed bandwidth.
NOTE: You cannot output LESS than the payload (green) rate is showing.

If needed, set the Transport Stream ID.
Set the desired table type. (Most common is ATSC and needed if you are rebranding or adding EPG).

10.   Dynamic PSIP (EPG) Settings.

<u>Options are:</u>

1. Automated:

Insert PSIP from TitanTV, Display Systems International, Gracenote or your own Tab de-limited text file.
NOTE: For instructions on how to create your own EPG data, go to Chapter 14.

PSIP Settings

PSIP Mode		PSIP URL	
Automated	⌄	ftp.tvmedia.ca	

PSIP UserName	PSIP Password	
aspenbcas	W14DKpsip_1	👁

2. Passthrough:

Passes all the EIT, ETT, EPG tables and PSIP data from a certain selectable source. You may still change your static PSIP as needed.

PSIP Settings

PSIP Mode		Passthrough Source ❓	
Passthrough	⌄	IP 1 In	🔵

3. Disabled:

This will strip all the EPG data from the stream.

4. Manual:

For adding your own Schedules in. (See Chapter 14).

11.   Inserting and multiplexing TsoIP

All IP connections (in and Out) can be done via the 3000 card ETH 1 and ETH 2 ports.
Once a valid TSoIP (UDP Multicast, UDP Unicast or SRT) stream is inserted into the system either by the ETH 1 or ETH 2), it should show up on the status of the screen for the appropriate input.

☰ **D2.MANAGE™**	openGear Slot ID: 2	admin ⌄

NAVIGATION	**Transport Streams**		
⬛ Status			
🔲 System Settings	**Inputs**		**Outputs**
(•) Transport Streams	+ ASI 1 In	⚙	+ ASI 1 Out ⚙
⊕ Firmware	ASI 2 In	⚙	+ ASI 2 Out ⚙
📄 Logs	IP 1 In	⚙	+ IP 1 Out ⚙
+ Features	IP 2 In	⚙	+ IP 2 Out ⚙
	IP 3 In	⚙	+ IP 3 Out ⚙

1. Inserting a TSoIP stream:

Make certain that the stream is present on the end of the Ethernet line either in the ETH 1 or ETH 2 port on the transport Streams page, click on the gear icon next to the IP input you wish to bring it in on. Unlike ASI, TSoIP inputs are "Virtual" and assignable so therefore do not align with a specific input port. Make certain that the port is "Enabled".

Dejitter Buffer: This will "Buffer" the incoming stream and smooth out common jitter.

Input the stream information either by using the boxes, or as in this case, paste the URL into the URL override. Using the URL override negates all the other boxes.

NOTE: If the stream is UDP, you can just replace the "SRT" with "UDP".
Once the information is filled out, be sure to click on SAVE, then Click Back to Streams.
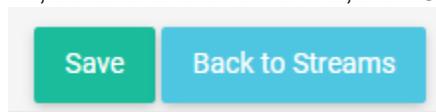
Once you are back on the Transport Streams page. You'll need to click Apply and Rescan.
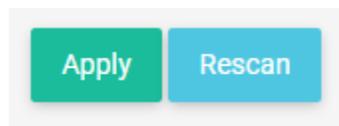
Then, active data/services should show up on the IP input on the Status page.
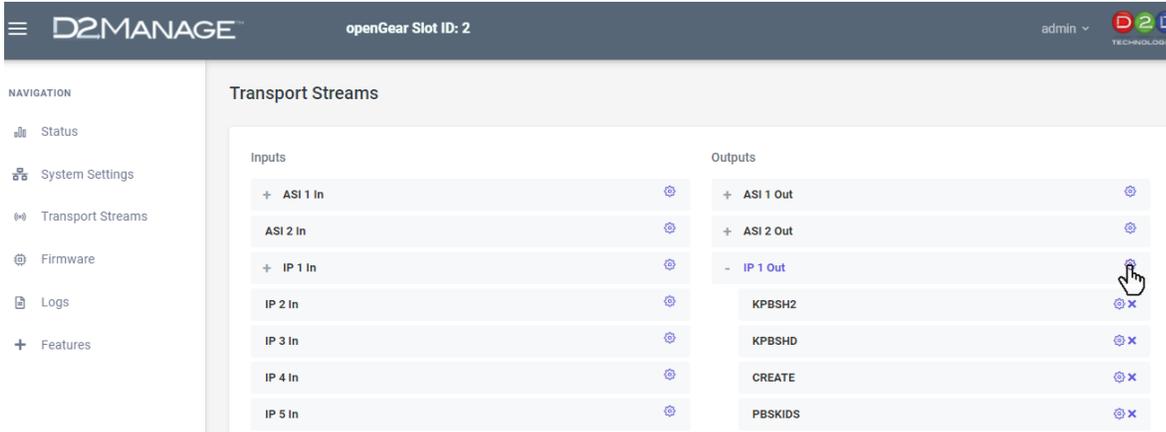
Once you have data coming in, from the Transport Streams Page, you can click on the plus sign, expand it and drag any of the services (or all) to any output.

➢ If none of the streams need to be altered in any way, you can set the Passthrough Matrix to Enabled and select the appropriate input for the output.

2. Setting up the IP output

Once you have dragged all of the services needed for the IP output. Click on the Gear near the top of the output.
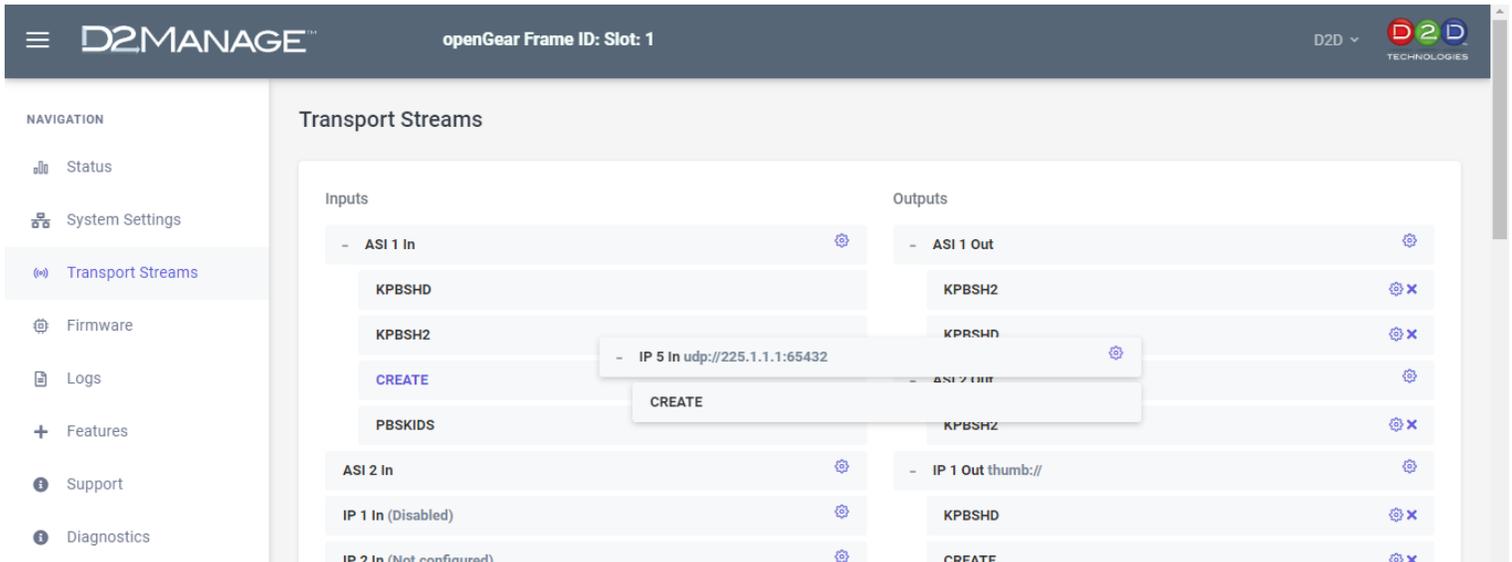
That will bring you into the setup page for the IP output. Set the Egress rate in bits. In this case, it is set for 20 Mbps.

Stream Settings

Egress Rate - Mbps
ATSC 1.0 Standard rate is 19.362 Mbps

| 20 |

◉ Mbps ◯ Kbps ◯ bps

Next you can set up the TSIP and table type.

MPEG Settings

Trans Stream ID

1234

Table Type

ATSC

Under that, is the Dynamic PSIP (Provided that you have the Guide Feature enabled.

PSIP Settings

PSIP Mode

Disabled

PSIP URL

PSIP UserName

PSIP Password

The VCT should be set for Terrestrial or Cable.

VCT Type

Type

Terrestrial

There are several choices for the output parameters:

Off: IP Output I disabled.
UDP: Send it out via UDP protocols.

Individual IP Settings

IP Protocol (Set to protocol OFF to disable IP stream)

UDP

Multicast IP

0.0.0.0

UDP Port

ETH Port

URL - Updated as options are changed. Custom options allowed, if supported by the protocol (EG: &myoption=value).

udp://:

> **Multicast IP:** Set the destination address for whatever is receiving the stream.
> **UDP Port:** Set the port number for the UDP broadcast.
> **ETH Port:** Choose which port on the back of the unit that the IP is leaving from.
> **URL:** Updated as options are changed. Custom options allowed, if supported by the protocol (EG: &myoption=value).

SRT: Send the stream via SRT (Secure Reliable Transport). For exact instructions on how SRT works, see the chapter titled:
Sending or Receiving SRT

Status Page Thumbnail: Creates a Thumbnail on the status page of the first service in that IP output.

Custom URL: Use this if you are sending something other than UDP or SRT such as RTMP, RTP or Zixi.

STATUS PAGE THUMBNAIL: Displays a thumbnail of the selected program on the Status tab.

This option does not send the selected program to the IP output, only to the thumbnail display on the Status tab.

12.   Firmware Tab

Firmware Update

Serial Number

40086

Firmware Build Date

2022-10-29_11-59-42

FPGA Version

06/25/2022 15:45:53

Latest Update Firmware Result

Firmware: d2mux3k_og_update-2022-10-29_11-59-42.sh. Success

Upload Firmware   Browse

Upload

This page lists all the firmware, build dates and FPGA data.

Update firmware on this page via the box on the bottom that says "Upload Firmware". Simply browse to it and upload it. The unit will prompt you for a restart.   You will need to press yes, and the unit will restart.

Upload Firmware   Browse

NOTE: THIS WILL CAUSE A SIGNIFIGANT OUTPUT INTERRUPTION WHILE THE UNIT REBOOTS.
Expect about a 10 to 60 second cycle. You shouldn't lose any settings or data when the new code is applied. However, new features with new code could have some things added, misplaced or changed that may affect the output.
For the latest released firmware version, go to:
https://d2dtechnologies.com/support/.

2.168   17.194
thumb:// 19.362 Mbps
Connected: 7h 6m 21s

ⓘkpbsⓞ
San Diego

13.   Logs Tab

Logs

Filter Selections   Filter Enable ☐

Log File Selection ❓

Current Log ⌄

Apply Filter and Refresh Log   Previous Entries ☐   Next Entries ☐   Download Unfiltered Log

Nov 1 16:05:10 (none) avahi-autoipd(eth1)[22536]: stat(): No such file or directory

Nov 1 16:05:10 (none) avahi-autoipd(eth1)[22536]: Found user 'daemon' (UID 1) and group 'daemon' (GID 1).

Nov 1 16:05:07 (none) D2Flex[812]: monitorTask: Ch4 IP 5 In UDP IP Rcv State: Receive Lost Sync (2208)

Nov 1 16:04:51 (none) D2Flex[812]: monitorTask: Ch4 IP 5 In UDP IP Rcv State: Receive Lost Sync (2207)

Nov 1 16:04:41 (none) avahi-autoipd(eth1)[22409]: stat(): No such file or directory

Any messages concerning the health of the device, inputs or outputs will be displayed here. If you need help deciphering these, please don't hesitate to email us and ask at d2care@d2dtechnologies.com .

The logs can be filtered and include all data for the selected day. Use previous or next to scroll through the displayed log. Previous logs (if available) can be selected with the Log File Selection option. If a more in-depth analysis is needed, go to the Support tab and press "Build and Download Diagnostic Package". Email the downloaded file along with a description of the symptoms to d2care@d2dtechnologies.com.

14.   Features Tab

Features

- EAS
- PSIP
- EPG
- IPSTREAMS_8

Upload License   Browse

Upload

This page will tell you which Features are installed in the unit. They are as follows:

> **EAS:** D2Alert – Inserts a compressed EAS message from a Dasdec or Trilithic EAS receiver that has the MPEG feature. It is received as a multicast and switched as needed. For more information, see chapter 7.
> **PSIP**: This is Static PSIP and allows the addition or manipulation of VCT (Virtual Channel Tables). This feature also allow the Muxing or de-Muxing of channels. Adds stuffing where necessary.
> **EPG**: Allows for Dynamic PSIP to be inserted from your own spread sheet (tab de-limited) file, Titan TV, Display Systems International or Gracenote.

IPSTREAMS_X: Shows the number of active IP streams available.
D2SWITCH: Offer the ability to switch from one incoming stream to the other based on what is needed.

15.　Support Tab

This tab stores the manual and the MIBS for SNMP monitoring.

16.　Diagnostics Tab

Diagnostic Package: If you experience issues with the unit, a stream or anything else Flex related, please click on the box, download the package and have it ready to email to support at d2care@d2dtechnologies.com.

Configuration save and restore: This feature allows you to save a configuration and restore one. These configurations are interchangeable between Flex 3000's but not any other Flex. Also, recognize that if you upgrade firmware, some of the configurations could be changed or relocated. Please refer to the Diagnostic tab help icons for more information.

Restore: This is where you upload and apply the saved configuration from this unit or from another Flex 3000. This allows a master configuration to be easily applied to multiple units.

NTP Status Check: Verify NTP Status' to display the current NTP status and sync statistics.

3. **Transport Streams, VCT and static PSIP**

5. Muxing, Manipulating and Adding Programs

On the "Transport Streams" menu, click on "Rescan" and let it scan, Once it has rescanned, click on the "plus sign" (+) next to the ASI In, you should see some programs show up.

Drag and drop the services to the desired output.
NOTE: If you need an entire stream to go to an output, you can just drag the whole input over instead of one at a time.

6. Re-branding the services and channels. Static PSIP or VCT

Click on the "Gear" icon of the ASI OUT (Not the individual outs) to make changes to the overall output
From here, you can manipulate the names and numbers.
You can modify elementary PIDS from the "Modify Elementary Streams" button
Be sure to hit save when you're done.

Edit Output ASI 1 Out Program 1

Source Program

Program Name	Input Port	Program Number
KPBSHD	ASI 1 In	3

Output Program
Program Number

1

PMT PID (hex)	PMT Version	PCR PID (hex)
30	0	31

7. Modifying the Elementary Streams

On the bottom half of the Edit Outputs pages is the table of Elementary Streams. Below that is the "Modify Elementary Stream button".
NOTE: All PIDS are in Hexadecimal.

Modify Elementary Streams

Elementary Streams for Output ASI 1 Out Program 1

Active	PID Out	Type	Port In	Prog In	PID In
Active	31	MPEG-2 Video	1	3	31
Active	34	AC3 Audio	1	3	34
Active	35	AC3 Audio	1	3	35
Active	36	AC3 Audio	1	3	36

Save   Back to Program

Elementary Streams

Output PID (hex)	Type	Input PID (hex)
31	MPEG-2 Video	31
34	Unknown	34
35	Unknown	35
36	Unknown	36

Save   Modify Elementary Streams   Back to Streams

That will take you to the Modify Elementary Streams page.   From there, you can change the PIDS as needed. BE CAREFUL, every PID needs to have a unique number in Hexadecimal. If you accidentally number 2 PIDS the same, you will create a "PID collision" which will cause severe on-air implications. If you do not want or need a particular video or audio PID to go through, you can simply change it to "Inactive".

4. **Using the GUIDE Feature to add dynamic PSIP and update the EPG**

8. Adding PSIP via TitanTV or Gracenote.

1. Click on the gear icon on the appropriate output.
2. That will bring you to the Edit Stream ASI (x) (OUT 1) menu.
3. Set your FCC issued TSID.
4. Leave the Version Number at 0.
5. Set tables to ATSC.
6. Set the PSIP mode to Automated.
7. Enter in your TitanTV or Gracenote credentials.
8. Set your Egress rate to 19392000.
9. Click "Save".

9. Passing EPG tables (Dynamic PSIP)

5. If you insert dynamic PSIP upstream, you will need to tell the Flex 3000 where to get it from.

Outputs

+   ASI 1 Out   ⚙

1. Go to Transport Streams and click on the gear for the ASI 1 out.

2. Scroll down to the PSIP Settings.

3. Select PSIP – Passthrough an select ASI 1.

PSIP Settings

PSIP Mode

| Passthrough ∨ |

Passthrough Source ❓

| ASI 1 In ∨ |

PSIP URL

PSIP UserName

PSIP Password

1. Adding EPG tables manually with a spreadsheet:

1. Click on the gear icon on the appropriate output.
2. That will bring you to the Edit Stream ASI (x) (OUT 1) menu.
3. Set your FCC issued TSID → THIS IS IMPORTANT!
4. Leave the Version Number at 0.
5. Set tables to ATSC.
6. Set the PSIP mode to Automated.
7. No need to set any credentials.
8. Set your Egress rate to 19392000.
9. Click Save.

1. Building and formatting the spreadsheet

Plan on designing your EPG / PSIP file with the following formats:

- air_date(YYYYMMDD) Or, 0 – 7 (See #1 below).
- air_time(HHMM) IN UTC time.
- duration(HHMM).
- Event ID.
- Event Title (EIT).
- Event Description (ETT).
- Entire Audience.

2. Airdate:

You have a choice. If you tend to air the same programs every week with little changes, you can use a day of the week format with 00 being Sunday and Saturday being day 06. Otherwise, put in the actual day the program airs minus your GMT offset. EXAMPLE: 9:00 PM. Eastern Daylight Time in Florida is actually 01:00 UTC the next day.

Airtime: PSIP is set on a UTC standard. (Coordinated Universal Time, Greenwich Mean Time or Zulu Time). Therefore, you must add that to the program times of the stations time zone. If the station is currently on Eastern Daylight Time, the UTC offset is + 4, Eastern Standard time is +5.

Duration: The length of the program in Hours and minutes.
Event ID. Start your first program of the day with this and repeat it daily.
Event Title: The actual name of the show
Event Description: A brief description of the show.
Entire Audience: Use G, PG, PG13, R for audience ratings.

Once you have an Excel sheet done, it should look like this:

A air_date(YYYYMMDD)	B air_time(HHMM)	C duration(HHMM)	D Event ID	E Event Title (EIT)	F Event Description (ETT)	G Entire Audience	H
20200704	0000	0030	00003	D2D Prog 3	D2D Prog 3 Extended Text	None	
20200704	0030	0030	00004	D2D Prog 4	D2D Prog 4 Extended Text	TV-G	
20200704	0100	0030	00005	D2D Prog 5	D2D Prog 5 Extended Text	TV-14	
20200704	0130	0030	00006	D2D Prog 6	D2D Prog 6 Extended Text	TV-MA	
20200704	0200	0200	00007	D2D Prog 7	D2D Prog 7 Extended Text		
20200704	0400	0100	00008	D2D Prog 8	D2D Prog 8 Extended Text	Entire Audience	
20200704	0500	0100	00009	D2D Prog 9	D2D Prog 9 Extended Text	None	
20200704	0600	0100	00010	D2D Prog 10	D2D Prog 10 Extended Text	TV-G	
20200704	0700	0030	00011	D2D Prog 11	D2D Prog 11 Extended Text	TV-14	

8. Save the spreadsheet in the following format: As a tab delimited text file with the following file name: eit_tsid_maj_min.txt
tsid = Transport Stream ID,
maj = Major Channel# and
min = Minor Channel#

EXAMPLE: For channel 18.1 with a TSID of 210: eit_210_18_1.txt for
for transport stream ID 210, major channel# 18, minor channel# 1.

Move the spreadsheet into the FLEX by using WinSCP: Download WinSCP (Free, safe program by Microsoft) from HERE. https://winscp.net/eng/download.php

1. Once downloaded, open it up.
2. Select "New Site" and file protocol as "SCP"

3. Host Name: Is the IP address of the FLEX.
4. Contact D2D support for login credentials.
5. Navigate to the "sch" Directory found in the root/d2flex directory. If there is no sch directory, create one. NOTE: Lower case only.
6. Move (or copy) the .txt file you created in Excel.
7. Reset the unit, wait a few minutes and see if any PSIP is passing through.
8. The log should show if there is ETT and EIT tables being generated.
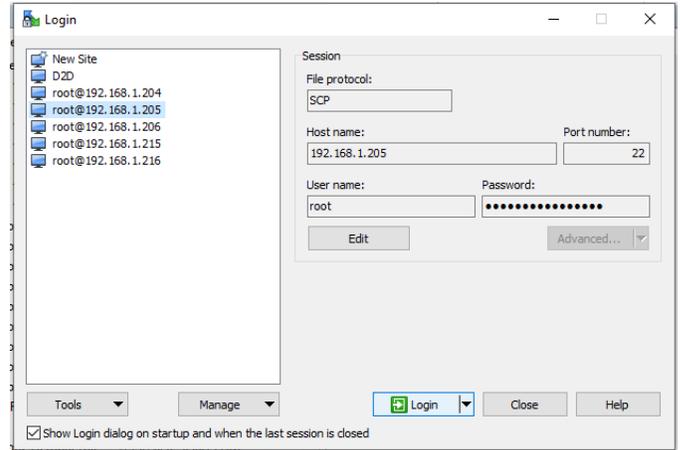
10. Sending or Receiving SRT

The SRT server sends a transport stream by listening for an SRT client to call and initiate a connection. Configure the IP port transport stream's GigE Setting on the Output Port Edit Transport Stream page.

1. Go to Transport Streams and click on the gear icon by the IP Output.
2. Go to bottom of the IP Output page.
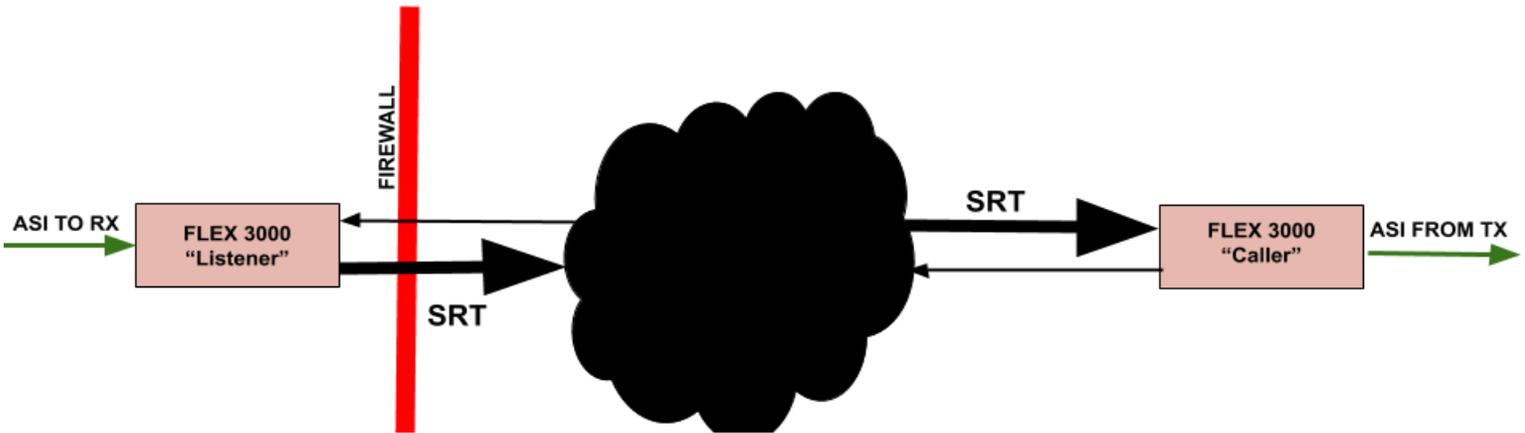
3. Set the IP Protocol to SRT. This will open a whole new set of boxes.
4. Decide whether this unit will be the caller or the listener. Note that one has to be a caller and one has to be a listener. Either one can push or pull the stream. This can be decided on where you need to open up firewalls or IT admin, etc. Typically, the listener is the one sending the SRT stream.
5. Set the egress rate at the top of the page. (Total aggregate data rate).

6. If you set the unit to be the caller, you will need to add the IP address that it will call back to. Keeping in mind that it may be calling back to a WAN gateway if it is on a public internet connection or otherwise outside your LAN.

7. Set the Server Port to the port you want to use for SRT transmission. It can be any 4- or 5-digit number. Stay away from 80,8080, 21, 22 or any other port your LAN may use. If the SRT listener is behind a firewall, the router must forward the SRT port to the SRT server IP Address. This port is important. NOTE: If the unit is set up to be the listener, then all you need is the port number. This will "Push" the stream to that port number on your gateway.

8. If this is going on the public internet, you will have to activate port forwarding on your router/modem.

9. ==Make certain to forward both UDP and TCP in both directions (If applicable)==. Only one side (typically the listener) normally has to have the port forwarded it. The other side (Caller) will call back to the public IP and ask it for all the traffic on: [Said Port number].

10. The other boxes in the menu are either defaulted or optional:

Latency (mS) ❓   Stream ID ❓   TOS ❓   TOS (hex)   TTL ❓

Be sure to open TCP and UDP on the correct port on your LAN. The default is 3000, but you can make it any port.

---

a. Latency: Defaults to 120 Ms. Can go as high as 8000 Ms. If you are experiencing packet loss, picture breakup, pixelization, etc. Try increasing the latency in 500 Ms increments.

b. Stream ID: A string that can be set on the socket prior to connecting. The listener side will be able to retrieve this stream.

c. TOS: Type Of Service - The second byte of the IPv4 header. Defaults to 184 (0xB8). Best to leave this as is unless you are working with an IT department that want to establish a QoS.

d. TTL: Time To Live. - A value for the period of time that a packet, or data, should exist on a computer or network before being discarded. Leave it blank and it defaults to 64. Which is probably adequate.

e. Send Buffer (bytes): Default size is 20,000,000 bytes which supports 19.4 Mbps stream with 8000 mS latency and RTT of 225 mS. Do not set unless 'Buffer Size Calculator' returns a larger value

f. Send Buffer Size Calculator: This is a tool that allows you to calculate the Send Buffer depending on the RTT (Round Trip Time) and the BPS (Bits Per Second). Default size is 20,000,000 bytes which supports 19.4 Mbps stream with 8000 mS latency and RTT of 225 mS.. Do not set unless 'Buffer Size Calculator' returns a larger value.

g. Max BW: Defaults to -1 (no bandwidth limiting). '0' enables Input BW and Over Head BW options. If you enter a "1". Then this menu appears:

Input BW (bps) ❓   OHead BW (%) ❓

i. Input BW (bps): Defaults to 0 (uses calculated input BW). Also, can specify exact input bandwidth. Only effective if maxbw is set to 0.

ii. OHead BW (%): Defaults to 25%. Only effective if maxbw is set to 0.

11. <u>Encrypting the steam</u> - There are 4 methods:

Encryption Mode   **PassPhrase (10-79 characters)**

| AES-256 ˅ |

    a. None: AES-128, AES 192, AES-256**.**
    b. Once you select anything other than None, a PassPhrase box will appear. Enter in any combination of characters from 10 to 79.

12. <u>URL:</u> The URL field shows the SRT options. It is updated as options are changed. You may directly edit the URL field (or paste a complete URL). Custom SRT options that are not available in the option boxes may be added to the URL, if supported (EG: &myoption=value).

If the feature "EAS" is enabled, the Flex 3000 will break the ASI output and insert the EAS message in place of programming.

1. Setup IP #8 to receive the signal coming from the Dasdec or Trilithic
2. Set the PIDs on the EAS Device to: Video 0 x 41. Audio 0x44, PMT 0x40
3. When you trigger an alert, you should see the status bar on input #8 turn green. The output should switch to the EAS slate and screech tones.
4. Make certain that the 3000 is not in pass-through mode. Otherwise, it will not work.
5. Be certain to turn off the de-jitter buffer on input #8, otherwise the signal may not make it through.
6. Set the EAS device to output about 3 Mbps of video.
7. Make sure that "EAS" is enabled in the Features Page.

3. Inserting EAS Alerts from a Dasdec or Trilithic EAS receiver/encoder

If the feature "EAS" is enabled, the Flex 3000 will break the ASI output and insert the EAS message in place of programming.

How it works:

Input #8 on the 3000 listens for the EAS to come in via UDP. The EAS device needs to be sending a video PID of 0x 41, PMT of 0x 40 and audio of 0x44. When we see that stream come in with those PIDS, we interrupt the ASI outputs with the Alert message. It is a good idea to set it up as a multicast stream for testing. That way you can troubleshoot it with VLC to make sure it is coming out of the EAS device. The EAS device MUST have the MPEG card or feature that will encode the signal into an MPEG 2 format so it can be put to air.

1. Make sure that "EAS" is enabled in the Features Page.
2. Setup IP #8 to receive the signal coming from the Dasdec or Trilithic 2. Set the PIDs on the EAS Device to: Video 0 x 41. Audio 0x44, PMT 0x40 3. When you trigger an alert, you should see the status bar on input #8 turn green. The output should switch to the EAS slate and screech tones. 4
3. Make certain that the 3000 is not in pass-through mode. Otherwise, it will not work.
4. Be certain to turn off the de-jitter buffer on input #8, otherwise the signal may not make it through.
5. Set the EAS device to output about 3 Mbps of video.

11. *Setting up DSM-CC type B Carousel PID insertion from an XCaster*

1. *Insert your program ASI into the ASI 1 on the back of the unit, once you do that, you should see the status update on the Status Page.*
2. *Go to the Transport Streams page.*
3. *Click refresh, a plus sign should show up on the ASI 1 In. That means that it has parsed the incoming ASI and sees the programs.*
   Note that it is possible that the plus sign could already be there if ASI was plugged in at the time it was powered up.
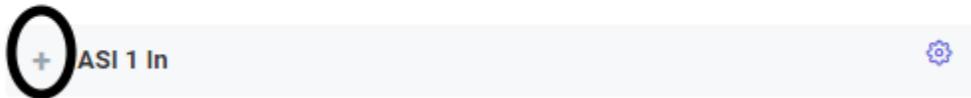
4. *Click on the plus sign of the incoming ASI stream and drag it over to ASI 1 OUT. That will MUX it (all PIDS) into the stream in their entirety. (NOTE: You can also drag and drop all the services individually if desired).*

5. Click Apply.

6. Now, go to the Transport Streams page and click on the "Gear" on IP 1 In.

IP 1 In (Not configured)   ⚙

7. *Configure the IP setting at the bottom of the page for the incoming stream of the Xcaster Carousel. In this case the IP address was a multicast of 225.1.1.1:54321.*

Individual IP Settings

UDP Port	GigE MAC	Multicast IP
54321	GigE 0	225.1.1.1

IP Protocol	ARQ Server IP	ARQ Server Port	Dejitter Buffer
UDP	0.0.0.0	0	Enabled

8. *Click Save. Then Back to Streams.*
9. *Click Apply and Rescan.*
10. *Once it is finished rescanning, the Plus sign should show up in the IP 1 box.*

+ **IP 1 In** (UDP 225.1.1.1:54321)   ⚙

11. *If you expand it, it will show up as PGM 1 in the IP input.*
12. *Now, drag that one program over to the ASI 1 Output and drop it in with the other programs.*
13. *Click Apply.*

Transport Streams

Inputs		Outputs	
− ASI 1 In	⚙	− ASI 1 Out	⚙
KPBSHD		− IP 1 In (UDP 225.1.1.1:54321)	⚙
KPBSH2		Prg1	
CREATE		KPBSHD	⚙✕
PBSKIDS		KPBSH2	⚙✕

14. *It will show up as another program number and say that "PGM [x] is converted from MPEG-Requires Program Edit.*

Prg5 Converted from MPEG -Requires Program edit   ⚙✕

15. *Click on the gear to open the edit screen for that program.*

16. **You can fill in the boxes to name the program anything. Or leave it as Prgx.**

Edit Output Prg5

Source Program

Program Name	Input Port	Program Number
Prg5	IP 1 In	1

Output Program

Program Name		Program Number ❓
Prg5		5

PMT PID (hex)	PMT Version	PCR PID (hex)
63	1	1fff

17. *THE PMT defaults to 63 HEX. Which may be a conflict so you can change that to something else if needed. Also the PCR should be changed as well so it doesn't conflict with another PCR in the channel.*
18. *You will need to assign a major and minor channel to it since it is ATSC and the mux will be trying to add those tables. Also assign a source ID. In this scenario, the channel numbers were made to coincide with the current channels line up and the source ID was set to 7.*
19. *Be sure to set the program to "Hidden and to Hide Guide. Otherwise, the program will show up as a separate ghost channel.*

VCT Entry

Major Chan Num	Minor Chan Num	Frequency
15	5	?

Hidden	Hide Guide	Path Select	Out of Band
Hidden	Hidden	Off	Not out of band

Source ID

5

20. *Click Save.*
21. *Take note of what PID the DSM-CC type B: object carousel says it is. HEX 64 is a common PID and therefore may need to be changed. To do that, click on Modify Elementary Streams.*

Elementary Streams

Output PID (hex)	Type	Input PID (hex)
64	DSM-CC type B: object carousel	64

[Save] [Modify Elementary Streams] [Back to Streams]

22. *Once you are in the Modify Elementary Streams box, you can change the PID to something out range of the other PIDS.*
23. *Click Save, then back to Program.*
24. *Then click on Back to Streams*
25. **Be sure to press Apply Pending and rescan so your changes are saved.**
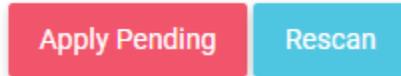
1. Adding PID 0x911 (WEA) to pass through

If you have a WARN system upstream of the Flex 3000, you will need to setup the 911 PID to pass through.

1. In the Transport Streams page, under the inputs, you will see a "Unreferenced PIDS section"
2. Setup the incoming ASI 1 to pass through the 911 PID to ASI 1 Out.

3. Click on Apply Unreferenced PIDS.
4. Click on Apply and Rescan under the Inputs on the same page.

12. Connecting to the unit via the Serial Port and IP address Discovery

If you cannot connect via IP or the unit has quit responding completely, you may be able to communicate with it via a serial connection:

Move the card to a port that has ample space to the right side of it so you can reach in and plug in a mini USB into the USM_UART port closest to the SD drive.

Use a terminal program such as TerraTerm to access it via serial protocols via 115200, 8n N,1.
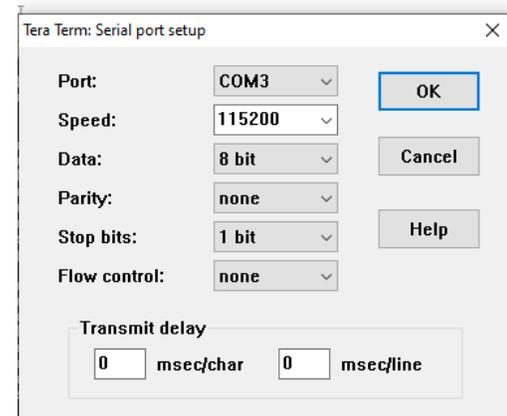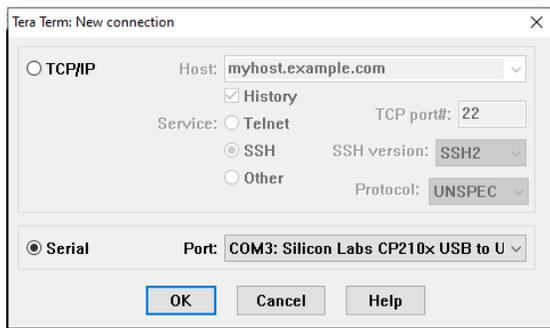
NOTE that a terminal program may need a third-party USB to UART Bridge VCP driver to function. You can download that driver here: https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers

Please contact D2D support for the login credentials

Type "ifconfig". That will give you the IP address of the M&C

5. Accessing a Flex if the IP address is unknown
In the browser tab, key in the unit's hostname followed by '.local/'

The host name defaults to the unit model followed by the serial number. If the hostname was modified in the user interface System page, use the modified name to access the system.

Examples:

Flex 3000:
d2flex5k-00000.local/

Flex 3000:
d2flex3k-000000.local/

Flex oG3000:
d2flex5k-og-000000.local/

6. Replacing a battery in the Flex 3000
The Flex can hold a CR 2032 battery that keeps the real time clock active if the NTP is not selected and the unit shuts down or reboots. If your card does not remember the time after a power cycle, and you do not rely on an NTP server, the battery can be added or replaced.

1. Remove the cover of the Flex.
2. CAREFULLY use a small flathead screwdriver to pry the battery up while holding the black retaining clip back.
3. Remove the battery. Be very careful not to lift up or break the tab under the battery.
4. Slide the new battery in its place.
5. Make certain that it is seated correctly.
6. Replace the lid.

13. Troubleshooting

1. No ASI into the unit:
Go to the "TRANSPORT STREAMS" tab and press RESCAN.
Make sure the ASI is plugged into the "RX" port.
Double check to make certain you have a valid ASI input.
Try resetting the unit via the "Systems" tab.

2. No ASI or IP out of the unit:
Make certain that you have either dragged the programs over to the output. Or have the Passthrough Matrix enabled.

3. No table names showing up:
Check the appropriate output and make sure it is set to ATSC and not MPEG or DVB.

4. Breakup on the video / audio, pixelization or bad picture on the output when using SRT:
Analyze the input setting on the page and look for excessive drops or retrans. This means that packets are not making it through due to poor internet connections on the caller or listener side. This could be caused by network traffic or even a faulty Ethernet cable.
You can try increasing the latency via the SRT settings. SRT latency defaults to 120 milliseconds and can be adjusted to a higher value to allow SRT time to recover lost packets. If the problem persists, download the diagnostic package and contact D2D Support.

5. No IP into the server (listener):

Double check the URL in the IP Input section. Make certain it is the correct syntax and IP address.
Is the firewall on the sending side open to all UDP/TCP traffic?
Make certain that the IP Output section is not disabled and there are no typos in the IP address.
Remember to include a port number and that it is accurate on both sides.

6. PSIP/EPG not showing up:

It can take up to 5 minutes for the EIT tables to parse and make it through the stream. Give it a few minutes and rescan your TV / channel number. Try again. Check the logs for ETT and EIT entries.

7. No PSIP/EPG out of the IP/SRT output:

Check and make certain that the sources are correct.

8. Wrong time/wrong program:

Be sure that the TV/STB reading the PSIP is set to the correct time
If you created the guide yourself from Excel, make sure you used GMT time and did the math correctly.
Set up an NTP server on the "Systems" page.

9. The unit seems to quit responding.

Set your SNMP communities strings to a unique value that is not 'private; or 'public'. It is possible that you are getting inundated with malicious login attempts.

Something else? Contact us, we are here to help:
http://www.d2dtechnologies.com/support or call: 904-323-4777 Option "2"