ADTRAN

TECHNICAL SUPPORT NOTE
Total Access 600 / 850 ATM Troubleshooting Tips

Introduction

The following is a list of the 10 most common concerns when troubleshooting Voice over ATM in the Total Access 850 and 600 series units. While this is not intended to be a definitive troubleshooting guide, it contains many caveats, recommendations, and causes for common symptoms.

1. Mapping of ATM CID to FXS/DSX channels in the IAD

Since there is no channelization in ATM LES-CAS (BLES) voice signaling, FXS ports and DSX channels are associated with ATM Channel IDs (CID). These statically assigned IDs generally correspond directly to CRVs on the CO trunk side, and typically start with a vaule of 16. These ATM CIDs are what the IAD uses to understand what FXS port or DSX channel should receive the call, and vice versa. First and foremost, understand that channels 1-8 (CID 16-23) are ALWAYS assigned to FXS 1-8 on the TA6xx series. Even if you have a TA604, 1-4 are used for the FXS ports, and CID 5-8 are unusable.

Moving to CID 24 and above, channels are mapped for every FXS port in service for that unit. After that, any remaining CIDs will automatically be sent out the DSX (if present) in a linear fashion. FXS ports can be set to Out of Service in the Interface > FXS Config [+] menu. This "frees up" that resource and allows it out the DSX (with the exception of the first 8, as mentioned above).

Most important to note with regard to the DSX is the way CIDs are assigned to DS0s. The first DS0 used will start at the last FXS port assigned. For example, if the application calls for FXS ports 1-8, the DSX port will take over at DS0s 9. If this is a TA616 and all 16 ports are desired, the DSX will start at 17. Because the TA600 series has a total of 32 voice resources, remaining CIDs after DS0 24 will "wrap around" starting at DS0 1 until all 32 resources are mapped.

Here is an example of this wrap-around with a TA616 with only 12 ports set in-service, as well as all available DSX channels for a total of 32 resources. Note that it is most common for DSX CIDs to begin at 65, and therefore the ATM Voice Gateway must be configured accordingly.

Port	CID	FXS Ports	DSX-1 DS0
1	16	1	
2	17	2	
3	18	3	
4	19	4	
5	20	5	
6	21	6	
7	22	7	
8	23	8	
9	24	9	
10	25	10	
11	26	11	
12	27	12	
13	73		13
14	74		14
15	75		15

16	76		16
17	77		17
18	78		18
19	79		19
20	80		20
21	81		21
22	82		22
23	83		23
24	84		24
25	65		1
26	66		2
27	67		3
28	68		4
29	69		5
30	70		6
31	71		7
32	72		8

Note that due to this wrap-around, channels 9-12 on the DSX are not available. Occasionally, this causes calls to come in on the "wrong channel" if a customer PBX is configured in a 1-to-1 manner, or causes PBX configuration problems in general. This behavior is true of the 04.04 and 04.07 codebase for the TA series. The 05 codebase ensures DSX channels are mapped in sequential, ascending order with no gaps or wrap-around.

Some additional caveats to note:

The Jetstream ATM VGw is limited to a total of 24 ports per endpoint. It is important to note that on a TA624, since the Jetstream only supports 24 channels, you cannot use all FXS ports simultaneously with any DSX DS0. You must take FXS ports out of service to use the DSX.

It is also worth noting that ISDN PRI is not an option for any ATM Voice Gateway other than the GenBand G6. The CID for the PRI D channel is commonly 64. Please configure accordingly so CID 64 hits DSX channel 24.

One final note, the TA850 is immune to the first-8 rule. Since it is modular, any CID value that does not have an FXS card/port to reach will be sent out the DSX, and can start from DS0 #1 (if slot 1 is empty, that is).

2. ATM Config and lack of ATM sync
The settings under *L2 Protocol > ATM Config [+]* are greately dependent on the DSLAM config and should be known ahead of time. If *L2 Protocol > ATM Status [+]* states that ATM Sync = No, and the T1 is green and error-free, then these settings are most likely incorrect. Since there are only 3 options, taking guesses at the right combination sometimes yields results quickly. If this approach is necessary, note that you may need to hit Ctrl-W to save with each change, as well as wait a few seconds for the cells to line up again.

Of course, establishing the requirements of Idle Cell, HEC coset, and Data Scrambling values ahead of time is preferred. These options, along with the VPI/VCI for each and every PVC, are required to successfully bring up Layer 2.

3. QoS, Cell Rates, CDVT and AAL Errors
General ATM layer errors can often signify or correlate with T1 problems or even bad hardware (either in the IAD or central office). However, AAL errors are more dependent on configuration both IAD-side and throughout the ATM network. ATM layer errors are listed in the *ATM Status [+]* menu via the "AP" counters. AAL2 (voice) and AAL5 (data) errors are listed separately, per PVC under the *PVC Status* submenu. For starters, any PVC set to "Voice" will default to real-time variable bit rate (rtVBR). Data PVCs (mapped to the router) default to UBR, which is generally sufficient.

However, the way the IAD prioritizes PVCs will not maintain quality throughout the network. Without proper QoS, cell/packet loss can occur and degrade voice quality. First and foremost, the Sustained Cell Rates and Peak Cell

Rates should be configured according to the total bandwidth requirements of the application. Just as important is the mean Cell Delay Varation (CDVT). The general rule is CDVT = (1/PCR)*32. The following chart shows typical PCRs and CDVTs for given bandwidth requirements:

Bandwidth (kbps)	PCR	CDVT (usec)
256	604	53000
512	1208	26500
1024	2415	13250
1536	3623	8833

Insufficient policing/shaping in the ATM network will cause quality problems due to cell loss and delay. These will be logged in the IAD as Sequence Errors, Drops, or Inserts. These counts can be found in the status menu for the voice PVC under *PVC Status > Protocol Status*, or under *Voice > Status > POTS Stats*, depending on firmware. It is normal to see some number of Sequence Errors, Drops, or Inserts; for example, before two-way talkpath is established at the very beginning of a call. Drops and Inserts represent voice samples utilized from the jitter buffer. The TA jitter buffer is 7 cells long, which at 5.5ms of voice per cell yields 38.5ms. Once the jitter buffer is exceeded, quality issues will be heard.

However, at no point should these counters constantly increment during calls. This indicates an ATM network problem if T1 errors have been ruled out. Excessive drops and inserts reflect the way the cells reach the IAD and therefore are not affected by the IAD. Voice quality problems percieved by the user behind the IAD must be addressed in the ATM network, in general.

4. Firmware Concerns
Firmware revision plays an important role in the TA's operation. Units should always utilize the most recent version of firmware found in the Support section of ADTRAN.com. Past issues or lockups/reboots have been addressed, as well as NAT bugs that could cause data traffic to cease, FXS chips to blow out against certain PBXs, etc. Version 04.04.71 is our most current recommended version for VoATM.

Very often, the incorrect file for a particular unit is uploaded and the transfer will fail. Remember that the *.bin file is the actual firmware build...filenames beginning with AD are for 3rd generation units (p/n 4203- or 4213-), 8D is 2nd gen 612/616/624 (p/n 4200-) and 2D is 2nd gen 604/608. When in doubt, consult ADTRAN.com's Support section.

Note that when a unit is converted from TDM to ATM firmware or vice versa, the configuration WILL be wiped out. This includes all IP addressing. A unit may not appear to recover after such a change and may require a factory restore. You can do this from a local craft port session by hitting Ctrl-T for terminal mode. Type "fact" and hit enter. If the unit is unreachable via the console, you will have to do this by a recovery method. Log in via the craft port using your terminal program of choice just the same, even if the unit doesn't appear to respond. Unplug the power, plug it back in, and IMMEDIATELY hold the "f" key on your keyboard. You have about a second to begin holding F, and continue to do so until you see a prompt that says "Restore Factory Defaults? (y/n)". Hit Y for yes and the unit will recover.

In a similar manner, units that have taken a power hit may have corrupted flash memory. This requires a reflash of firmware from a boot recovery menu. To do this, perform the same procedure as the recovery factory restore, but hold "b" for boot until you reach the bootstrap menu. You will have to reflash the unit via an XMODEM transfer in your terminal program. See IAD firmware upgrade instructions on ADTRAN.com for details.

5. Configuration and Memory Concerns
Not far off from the above section on firmware, it is important to mention the possibility of an IAD losing its configuration through a power anomaly or the like. The unit may appear to be totally lost and unreachable, but it may have just lost its IP addressing and would be fully operational if reconfigured. In some cases, the unit may be in a constantly-rebooting state. If the front-panel LEDs are continually cycling, perform the factory restore procedure above.

Configuration files transfered from a unit are generally only good for a same-generation unit on relatively identical firmware. Furthermore, the method in which the config was captured (XMODEM, TFTP, or terminal-mode

"download" command) generally must be the same method used to apply that file to another unit. For example, capturing a config via XMODEM and later applying it via TFTP may result in a failure or corrupt config.

6. Multi-line Phones and Other Analog Interface Problems
It should be established that multi-line phones will most certainly have problems behind any channel bank due to their electrical current draw. These problems manifest themselves in symptoms such as ghost rings, dropping lines, all lines ringing at once, and crosstalk/privacy issues between lines. There are settings in the *Interfaces > FXS Config [+]* menu that can help the situation, most importantly the "Battery Mode" setting. Changing this to "Low Batt" from its default of Auto may assist. Additionally, a MLP resistor block can be used (ADTRAN p/n 1203602L1) to further assist, but keep in mind there is no guarantee that every MLP will work.

For some PBXs, the Impedance setting may need to be changed for proper termination if intermittent dialtone is experienced on outbound attempts. Ring voltage can also be adjusted for PBXs that do not always receive a call. Many PBXs require different ring voltages to trip. 2nd gen and 3rd gen units differed in their default ring voltage, so it may appear as if swapping out a unit has solved the problem. When in doubt, always try adjusting these FXS interface settings appropriately.

7. Codec Choice
In VoATM, any menu where codec is displayed is representative of the last (or current) call's cell rate. The IAD automatically chooses its codec based on the received cell rate. 100 cells per second per call is ADPCM G.726. 200 cps per call is PCM mu-law G.711. This is part of the spec and is not adjustable by the IAD. Codec choice is a feature of the voice gateway. If at any point, the audio is garbled and a codec display is toggling, this may indicate ATM network problems. Also note that ATM profile 9 only allows G.711 PCM

8. Echo
In any scenario where there is an A/D conversion, compression, or packetization of voice, the end device is only responsible for cancelling echo on the talkpath outbound towards the device performing the opposing gateway function. In other words, the IAD is responsible for cancelling echo in the outbound talkpath perceived by the far-end party. Echo perceived by the user behind the IAD must be addressed in the upstream gateway.

On occasion, this echo can also be the fault of acoustic imbalances on the analog pair on a PBX station. To prove this, it would generally not be present on every PBX station when calling the same number. Echo received on the inbound ATM side would be equal for the same call from any/all stations. Sometimes, adjusting the TLP decibel gain in the *Interfaces > FXS Config [+]* menu may help with acoustic echo to stations, but not always.

9. Problems with Fax/Modems
Analog data devices are extremely sensitive to any layer1 or layer2 errors, as well as analog conditions. For fax/modems that cannot connect or complete a transmission, first ensure that the T1 is error-free. Next, be sure of the same error-free nature on the ATM/AAL2 layer as stated in part 3. Occassional drops/inserts/sequence errors are near-invisible to speech, but fatal to analog data.

The next step would be to ensure any fax/modem line is hard-set to G.711. Compression causes further quantization error and again can be fatal to analog data, therefore it is not recommended for fax/modems.

Finally, the Tx and Rx TLP dB gain should once again be addressed in the *Interfaces > FXS Config [+]* menu. If the dB level is too high, the analog waveform may be clipping. If it is too low, it may drop below a threshold perceivable by the device. Unfortunately, there is no science to this...levels must be adjusted at will until a working setting is found. To reduce variables, fax/modems should always hang directly off IAD FXS ports and not through a PBX station, as this is another potential source of dB uncertainty. This does not apply to PBX's fed by DSX T1, as the IAD is not intrusive to the talkpath on the DSX and therefore cannot adjust talkpath gain.

Batt Mode in the FXS menu should also be changed to Low Battery, as the Auto setting can cause changes to the voltage/current on the line that may disrupt a transmission in progress. Finally, if the Impedance setting is 600 ohms plus 2.16uF of capacitance, this is designed to filter high-frequency noise. Change this setting to 600 ohms with no capacitance, as often the filter can have adverse effects on analog data.

10. DSX Port Config options
On some versions of firmware, under *L2 Protocol > DSX Voice > Config [+]*, there is an option for Tx and Rx OAM cells. This is only in reference to OAM cells when the DSX port falls into alarm and does not affect the ATM layer. Changing these settings is discouraged as a factory restore may be required. This is errata and will be addressed in the next major revision of firmware.

If you experience any problems using your ADTRAN product, please contact ADTRAN Technical Support.

DISCLAIMER

ADTRAN provides the foregoing application description solely for the reader's consideration and study, and without any representation or suggestion that the foregoing application is or may be free from claims of third parties for infringement of intellectual property rights, including but not limited to, direct and contributory infringement as well as for active inducement to infringe. In addition, the reader's attention is drawn to the following disclaimer with regard to the reader's use of the foregoing material in products and/or systems. That is:

ADTRAN SPECIFICALLY DISCLAIMS ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL ADTRAN BE LIABLE FOR ANY LOSS OR DAMAGE, AND FOR PERSONAL INJURY, INCLUDING BUT NOT LIMITED TO, COMPENSATORY, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES.