

Pro:Idiom Key Loss Avoidance - Best Practices

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Key Loss Causes

There are two mechanisms which can cause Pro:Idiom key loss in commercial television sets that have been identified to us by LG

- Unapproved mapping or remapping of PIDs
 - Off air (OA) ATSC receivers may use PIDs which conflict with PIDs in use in Pro:Idiom licensed systems.
 - edgeQAMs map or remap PIDs in violation of the Pro:Idiom (P:I) licensing agreement.
 - Other unapproved digital video equipment may also use PIDs which conflict with P:I licensed equipment.

- TV set power on sequencing design problems
 - A very small number of TV set models are known to have power up sequencing issues that cause the Pro:Idiom licensed decryptors to operate improperly. The manufacturers of these sets have taken strong corrective action measures to update them. Contact your specific set's manufacturer for details.

Causes - PID remapping

PID mapping at the COM24 receiver

Pro:Idiom PIDs are in a protected range

Channel 1	Channel 2
VIDEO PID = 0x27	VIDEO PID = 0x27
AUDIO PID = 0x30	AUDIO PID = 0x30
Pro:Idiom PID = 0x105A	AUDIO PID = 0x31
	Pro:Idiom PID = 0x105A

PID remapping at the edgeQAM

Pro:Idiom PIDs have been remapped and overlap with Audio PIDs on other channels

Channel 1	Channel 2
VIDEO PID = 0x13	VIDEO PID = 0x13
AUDIO PID = 0x18	AUDIO PID = 0x18
Pro:Idiom PID = 0x1A	AUDIO PID = 0x1A
	Pro:Idiom PID = 0x1B

Avoidance Techniques - Off Air Receivers

■ ATSC off air receivers

- There is no way to control the PID mapping used in broadcast programming and we recommend that this equipment NOT be used in P:I systems unless the broadcast PIDs can be remapped in accordance with the P:I system requirements.
- If an installer does choose to use ATSC off air receivers, broadcast off air (OA) channels MUST NOT be placed adjacent to P:I protected channels in the channel map. It does not matter where the physical channels are located, only whether they are mapped to adjacent channels in the TV lineup.
- A non-P:I, non-off air channel MUST be placed in the channel map between any broadcast channel and a Pro:Idiom protected channel. The COM1000 EPG channel makes a good buffer. Analog SMATV channels can also be used as buffers.

Avoidance Techniques - Off Air Channel Lineup

NO! – Off Air and P:I adjacent at 2 locations in the channel ring.

QAM plant channel	Analog plant channel	Channel map channel	Station	Satellite/Air Ch	Signal Type
21-1		4	WFOR-4 CBS	22 / 4.1	HD OA
22-3		5	WTVJ-6 NBC	31 / 6.1	HD OA
23-3		6	WSVN-7 FOX	7 / 7.1	HD OA
24-3		7	WPLG-10 ABC	10 / 10.1	HD OA
25-3		8	WSFL-39 CW	19 / 39.1	HD OA
26-3		9	WPBT-2 PBS	20 / 17.1	HD OA
27-3		10	WLTN-23 Univision	23 / 23.1	HD OA
28-3		11	WSCV-51 Telemundo	51 / 51.1	HD OA
29-1		12	A & E	265	DTV HD P:I
	2	13	AMC	254	DTV SD Analog
29-2		14	Animal Planet	282	DTV HD P:I
	3	15	Bloomberg	353	DTV SD Analog
30-1		16	Bravo	237	DTV HD P:I
	4	17	Cartoon Network	296	DTV SD Analog
30-2		18	CNBC	355	DTV HD P:I
31-1		19	CNN	202	DTV HD P:I
	6	20	Comedy Central	249	DTV SD Analog
31-2		21	Discovery Channel	278	DTV HD P:I
	7	22	E! Entertainment	236	DTV SD Analog
31-3		23	COM1000 EPG		SD
32-1		24	ESPN	206	DTV HD P:I
32-2		25	ESPN 2	209	DTV HD P:I



Avoidance Techniques - Off Air Channel Lineup

Yes! – Analog or non-P:I SD channels between each OA and P:I.

QAM plant channel	Analog plant channel	Channel map channel	Station	Satellite/Air Ch	Signal Type
21-1		4	WFOR-4 CBS	22 / 4.1	HD OA
22-3		5	WTVJ-6 NBC	31 / 6.1	HD OA
23-3		6	WSVN-7 FOX	7 / 7.1	HD OA
24-3		7	WPLG-10 ABC	10 / 10.1	HD OA
25-3		8	WSFL-39 CW	19 / 39.1	HD OA
26-3		9	WPBT-2 PBS	20 / 17.1	HD OA
27-3		10	WLTU-23 Univision	23 / 23.1	HD OA
28-3		11	WSCV-51 Telemundo	51 / 51.1	HD OA
31-3		12	COM1000 EPG		SD
29-1		13	A & E	265	DTV HD P:I
	2	13	AMC	254	DTV SD Analog
29-2		14	Animal Planet	282	DTV HD P:I
	3	15	Bloomberg	353	DTV SD Analog
30-1		16	Bravo	237	DTV HD P:I
	4	17	Cartoon Network	296	DTV SD Analog
30-2		18	CNBC	355	DTV HD P:I
31-1		19	CNN	202	DTV HD P:I
	6	21	Comedy Central	249	DTV SD Analog
31-2		22	Discovery Channel	278	DTV HD P:I
32-1		23	ESPN	206	DTV HD P:I
32-2		24	ESPN 2	209	DTV HD P:I
	7	25	E! Entertainment	236	DTV SD Analog

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Avoidance Techniques - edgeQAMs

■ edgeQAM PID remapping

- A number of edgeQAM products have been designed specifically to work in Pro:Idiom systems and are known to correctly manage Pro:Idiom Key Management message PIDs including but not limited to Technicolor's QAM24 and Video Propulsion's Floodgate. Check with other manufacturers regarding their equipment.
- Two other commonly used edgeQAMs from Harmonic Lightwave, the NSG9116 and the NSG9000, are known to employ PID remapping schemes which can create issues in distribution networks using Pro:Idiom. The following slide section will present a port mapping method which, while it is not strictly within the Pro:Idiom guidelines, does avoid PID reuse which has been shown to break P:I keys.

Avoidance Techniques - NSG edgeQAM port mapping

- When using Harmonic edgeQAMs in the paradigm mode the position of the UDP port in the list of ports available for a given channel sets the first digit of the PID value.
- If you pick the first available UDP port value for a given channel all the PID values will start with one, if you pick the second available port value all the PID values will start with two, etc.
- Reuse of the same PID value is a major contributing factor in key loss and should be avoided when mapping out the IP and port scheme used to send the data to the QAM.
- DO NOT USE THE FIRST TWO UDP PORTS AVAILABLE OVER AND OVER AGAIN. Channels that are set up this way will have PID values 10, 13, 18 and 19 or 20, 23, 28 and 29 associated with them.

Avoidance Techniques - NSG edgeQAM port mapping

- Available UDP ports for QAM1 Program 1 and 2 are 257 - 511
 - UDP 257 -> QAM 1 Program 1 -> PIDs 10, 13, 18, 19 (for PMT, video, audio1, Pro:Idiom respectively).
 - UDP 258 -> QAM 1 Program 2 -> PIDs 20, 23, 28, 29

- Available UDP ports for QAM2 Program 3 and 4 are 513 - 767
 - **UDP 513** -> QAM 2 Program 3 -> **PIDs 10, 13, 18, 19** } **NO! PIDS are reused**
 - **UDP 514** -> QAM 2 Program 4 -> **PIDs 20, 23, 28, 29** }

 - **UDP 515** -> QAM 2 Program 3 -> **PIDs 30, 33, 38, 39** } **Yes! PIDS are unique**
 - **UDP 516** -> QAM 2 Program 4 -> **PIDs 40, 43, 48, 49** }

- Available UDP ports for QAM3 Program 5 and 6 are 769 - 1023
 - **UDP 769** -> QAM 2 Program 3 -> **PIDs 10, 13, 18, 19** } **NO! PIDS are reused**
 - **UDP 770** -> QAM 2 Program 4 -> **PIDs 20, 23, 28, 29** }

 - **UDP 773** -> QAM 3 Program 5 -> **PIDs 50, 53, 58, 59** } **Yes! PIDS are unique**
 - **UDP 774** -> QAM 3 Program 6 -> **PIDs 60, 63, 68, 69** }

Avoidance Techniques - SW updates

- Technicolor is constantly working to improve the features and performance of the COM1000 system.
- It is usually beneficial to update COM24s to the most recent SW revision whenever a field visit is necessary for other reasons.
- COM24 cards should usually be updated to the most recent release at system integration.
 - Check the Technicolor Support Services website for the most current release and field service bulletins
 - Your Technicolor Multi-Client Solutions Sales representative (Tony Watters) will alert you whenever new SW versions are released.
- SW release version ST02.05.13 incorporates 2 new updates to improve or eliminate Key Loss events
 - Adds support for user selectable Second Audio Program (SAP) support in the web based configuration tool
 - SAP is defaulted to off
 - Under some combinations of circumstances, SAP has been shown to cause P:I key loss

Avoidance Techniques - RF, RF, and RF

Although not strictly a key loss avoidance technique, making sure the DIRECTV satellite feed and cable distribution networks are constructed with approved components and good workmanship practices, and operating within recommended equipment limits can significantly decrease service calls which claim “key loss”.

Of the systems investigated personally by Technicolor MCS Field Service staff, on average less than 40% of televisions claimed to have suffered key loss events actually responded to rekeying. The other 60% either had no problems or problems other than key loss.

Many of the rooms where broken TVs were reported had obvious distribution plant problems.

Several sites which reported key loss and other serious operational issues had obvious satellite feed problems to the headend.

DIRECTV has published an excellent installation guide for the COM1000 system. USE IT!



Appendix - A Key Loss Example

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The Problem - Illegal PID remapping

The screenshot shows the NSG 9000 StandAlone Manager web interface. The browser address bar shows `http://192.168.100.43/`. The interface includes a navigation menu with tabs for Platform, Applications, Monitoring, and Reports. Under Monitoring, there are sub-tabs for Traffic, Alarms, Diagnostics, and Logs. The main content area is titled "Output Module" and shows a tree view of the "Output Hierarchy" for "Module 6". The hierarchy is organized into four RF Port sections: RF Port 1, RF Port 2, RF Port 3, and RF Port 4. Each RF Port section contains QAM services (e.g., QAM-6.1.1, QAM-6.1.2, QAM-6.1.3, QAM-6.1.4) and their associated services. Within each service, various PIDs are listed. The PID 0x2A is highlighted in three different locations: under Service 1 of QAM-6.1.1, under Service 2 of QAM-6.1.2, and under Service 2 of QAM-6.1.3. Two red arrows point from the text on the right to these specific PID entries.

On this channel PID 0x2A is a Pro:Idiom Key Management message PID

On the adjacent channel PID 0x2A is a second audio PID.

During a channel change the P:I decryptor device can misinterpret SAP data as a Key Management message.



The Solution - Control the PIDs

The screenshot shows the NSG 9000 StandAlone Manager web interface. The browser address bar shows `http://192.168.100.43/`. The page title is "NSG 9000 StandAlone Manager - Microsoft Internet Explorer provided by Thomson Multimedia". The interface includes a navigation menu with "Platform", "Applications", "Monitoring", and "Reports". The "Monitoring" section is active, showing "Output Module" for "Module 6". The "Output Hierarchy" tree is expanded to show "RF Port 1" and "RF Port 2". Under "RF Port 1", there are four QAM services (QAM-6.1.1 to QAM-6.1.4) with their respective TS IDs and sub-services. Each sub-service lists several PIDs. Arrows from the text on the right point to the following PIDs: 0x1A, 0x2A, 0x3A, 0x4A, 0x5A, and 0x6A.

On this channel PID 0x2A is a Pro:Idiom Key Management message PID

The Key Management message PID is not reused anywhere else in the multiplex

