Troubleshooting an IP World

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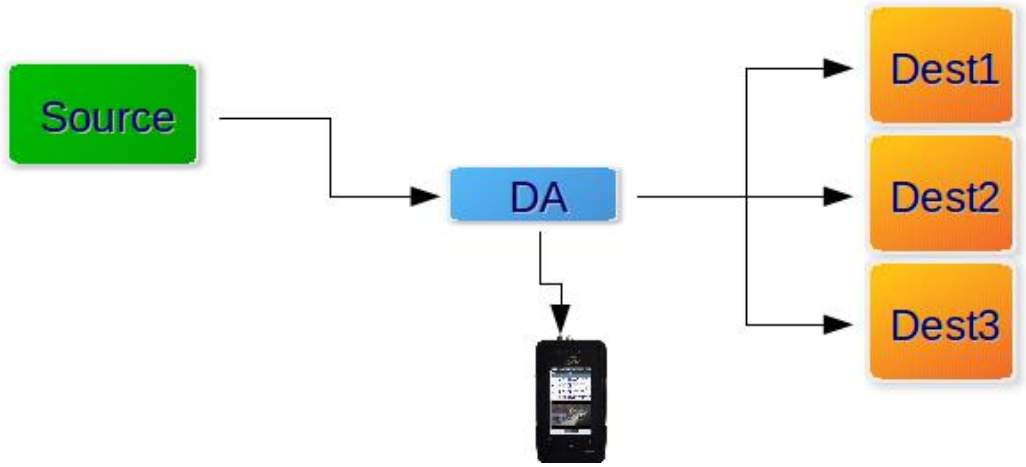
Today's video network is undergoing change. Conversion from ASI to IP and now SDI to IP is on every video engineer's mind. The connectors are changing from BNC to RJ45 or even fiber. New facilities are targeting IP technology to reduce cost and to try to minimize obsolescence. IP technology is attractive due to the availability of off the shelf IP switches that are more economical than traditional BNC style routers. IP does impose some troubleshooting difficulties that we will talk about in this paper.

Traditional BNC style installations are all point to point connections. While this is a nightmare to cable, it is easy to troubleshoot. If a signal originates from point A and is not reaching point C downstream there is only one path that the signal can travel due to the dedicated cabling required. Typically these signal go through a distribution amplifier and it has extra outputs that an analyzer can be attached to. So for the BNC installation an engineer could simply go from point to point and plug an analyzer in to determine where the signal is being dropped or corrupted.

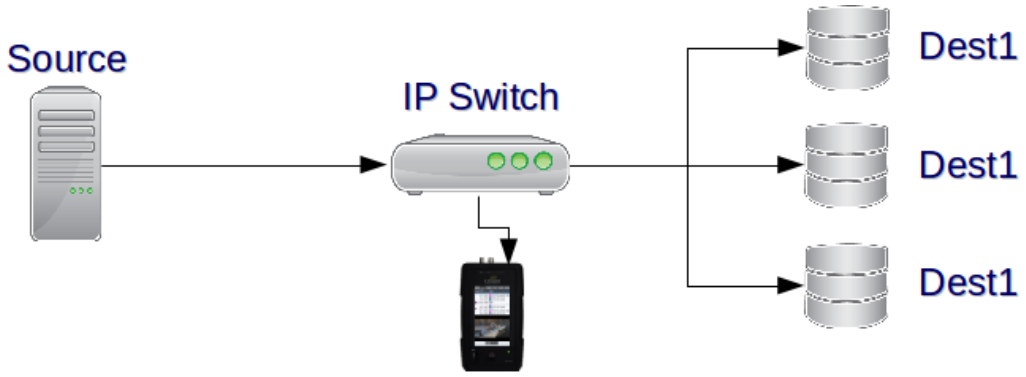


If no distribution amplifiers are used, most analyzers allow the signal to be looped through the device so that it can be inserted in-line between points of interest to determine the problem area.

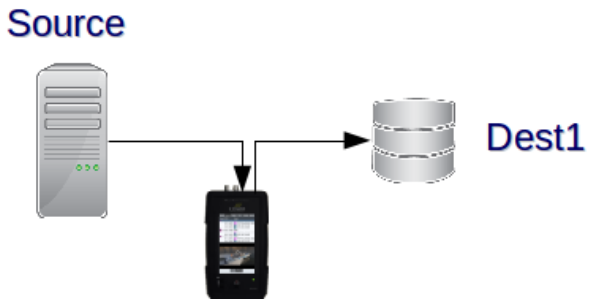
With an IP installation the engineer could try this same approach. The distribution amplifiers and routers are replaced with IP switches and they generally will have available ports. However if the analyzer is plugged into an available port the video data will not be present due to the algorithm in the switch intended to minimize excess network traffic. The IP switch will only pass the data to ports that either match the destination IP address or in the case of multicast, any port that is requesting the video traffic using IGMP. The end result is that the analyzer will not see the traffic without extra setup. Most managed switches allow a port to be configured as a monitoring port, which allows all data to pass to

that particular port. The setup for this varies by manufacturer of the switch. In addition to the setup, this configuration may not be ideal. If all of the traffic is being directed to a single monitoring port you must ensure that the total bandwidth of the entire switch does not exceed the port capability. For instance, if an 8 port Gigabit switch is used it can pass up to 1 Gb/s to each port. As an example it could have 2 sources feeding into it at 1 Gb/s each and using the other 6 connections for downstream devices. In this case the switch would try to force the entire 2 Gb/s (2 sources 1 Gb/s each) to the monitoring port which is not possible and packets would be dropped on the monitoring port.

If the video traffic is multicast, this allows multiple devices to receive the stream simultaneously and the analyzer could configure IGMP to request the data through the managed IP switch. In this case the monitoring port is not necessary. One limitation of both the monitoring port and using IGMP is that alternate ports are being used, so the actual video path is not being followed exactly.



The third option is to insert the analyzer in-line with the video traffic. Most analyzers do not have this capability, and for this reason the Tresent Technologies IPQ1000 handheld MPEG analyzer was born. The IPQ1000 has two Ethernet ports that allows the engineer to put the device in-line with the video traffic. Since the device is in the actual path it eliminates possible complications such as a bad port on the switch or a failed cable that would not be detected in the previously described cases.



The IPQ1000 always operates in promiscuous mode that allows all transport streams on the Ethernet cable to be displayed without additional setup. This makes the device very easy to use with minimal setup. Because it shows all transport streams it is capable of identifying video traffic that was not intended to be present. This can happen if a switch is faulty/misconfigured, or improper setup of the network or devices. It is difficult to look for a unicast address that you don't even know exists. Since the IPQ1000 runs in promiscuous mode it will display the unwanted traffic so it can be removed or re-routed.

Another use case could be an encoder using a unicast address. The stream is not being receiving at the monitoring station. All physical connections and power to all devices look good. Inserting the IPQ1000 in-line with the encoder will immediately display the transport stream as well as the IP settings such as source IP, destination IP, and port number. In many cases it is simply an address or port number mismatch, and the IPQ1000 will display this information by inserting the device in-line without any additional setup.