Broadcast Pix

Application Note

Inputs, Channels and M/E's

Just what is an input and how does it compare with a channel and what is an M/E?

You would think that is a pretty straight forward question, but when choosing a switcher or Integrated productions system (IPS) it's not as straightforward as you might think. By following a few simple steps and understanding the logic of how a switcher works, clarity can be achieved.

Firstly, it is important to understand the types of input signals and then separate signal routing from signal processing. Channels are often used to describe processing inputs, although not by everyone, so for the purpose of this discussion we will only use inputs.

Types of inputs

In today's world, there are fundamentally 3 types of switcher inputs:

1. Physical inputs - typically these are SDI or HDMI video connectors
2. Network inputs – inputs that are on the network and come in through an IP Cat5 or Cat6 type connector – one physical connector can of course carry multiple signal inputs.
3. Internal inputs – these are internally generated and could be Stills, Clips or Graphics

Signal Routing

Think of routing as pre-switching; choosing the inputs to the processing engine from a larger number of inputs connected to or within the system.

Signal Processing

Signal processing determines the number of simultaneous signals or elements that can be combined to produce your output and should be determined by the look of the content you are trying to produce.

The sources for these elements are typically from all 3 types of input, some may be external and physical, like an HDMI or SDI camera, some might be networked, like an NDI camera or a PowerPoint presentation streaming over the network from another PC, some might be internally generated, like Stills, Clips or Graphics.



The Mix/Effects bus (M/E) is a signal processing architecture that was developed in the late 1960's to combine multiple signals and backgrounds due to the limitations of analog processing. The analog signal degraded too much if it was 're-entered' so M/E architectures are cascaded, with each M/E introducing a new key or process; the more preset effects, the more M/E's you need.

In today's digital world, multiple inputs and effects can be processed at the same time making the M/E architecture redundant, but due to the familiarity with the user interface amongst Broadcast trained operators, many manufacturers emulate the M/E interface. This often creats limitations in the amount of processing (for example each M/E may only have one key) and drives users to larger multi M/E systems to get the number of inputs and keys required to create their content.

In marketing materials, manufacturers will describe the number of inputs differently. Many will say we have a 16-input system, but not specify that if you are using an internal Clip Store or Graphics Generator it will use up one of these inputs to get the signal into the processing engine. Many switchers control a cross point switch (either built in, or external) before the processing engine and claim 32 inputs, but only 16 of these can be combined simultaneously.

In the IP world, any source connected to a network can be selected on the network input, so in many ways an IP network behaves like an infinite cross point switch, where a source is selected by using its IP address.

What does all this mean?

Don't be fooled by large numbers in glossy brochures – break down the architecture, M/E or otherwise, to determine how many signals can be processed simultaneously – this ultimately determines the look of your program and the power of the system. Then check that the number and type of physical inputs (whether HDMI, SDI or Networked) serves your needs and remember, you can always add external routing and in the case of IP it is inherently built in, assuming your control software can manage it.

For example: A Broadcast Pix FX10 can process 6 Video inputs, via physical SDI or HDMI, 4 Network Inputs and 8 Internal inputs (Clips, stills and Graphics) simultaneously – so with 18 simultaneous inputs, it has enough power for even the most challenging productions even though we only describe it as a one M/E switcher.

Most Switchers and Integrated Production Systems based on software running on a high-end server will process about 16 -18 HD inputs in parallel without hardware acceleration. Systems claiming more than this are generally hardware based and may be limited in terms of their handling of networking and internal inputs as well as the integration and simplification of control, making them harder to set up and use.

If in doubt, find out what the user is trying to achieve and arrange a demo – they will be surprised at the power of our systems. We have heard multiple times over that with an FX, we can reproduce the power of a competitive 4 M/E system.

About Broadcast Pix

Broadcast Pix provides everything you need to make great programs, elegantly integrated into a single software package, with an easy to use interface and a layer of automation that enables a professional show to be produced at the touch of a button. Our BPswitch, RadioPix and StreamingPix integrated production solutions, were designed to simplify live broadcasting and streaming for users of any level of experience or background. Plus, the BPNet ecosystem provides cost effective, secure cloud services for backup, control, and collaboration.

Founded in 2002, Broadcast Pix has more than 5,000 government, broadcast, live event, and visual radio customers in more than 100 countries.

To learn more, visit www.broadcastpix.com.

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