Control and Monitoring in an IP infrastructure

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This presentation is not about why we should go to IP

It is about how we get there with respect to control and monitoring

Why do we need a Control System in an IP infrastructure?

- **Today** (yesterday) a video infrastructure was based on a central SDI router.
- With this router you would get a control system that controlled the cross-points and made physical connection between sources and destinations. (circuit switching)

- **The next generation** (as of today) is based on one or more IT switches and is becoming way more complex to control!
- In IP networks there is no router control SW anymore that comes with the router/switch manufacturer……
- Instead you suddenly need to control hundreds to thousands of devices to mimic what you did yesterday with an SDI router

Why do we need a Control System in an IP infrastructure? (cont.)

- The SDI router was by nature a non-blocking device
- The IP switch in a distributed system can potentially become blocking and “tie-line” or better “pipe-line” management needs to be in place.
- The SDI router in critical installations had a redundant crosspoint where single points of failure were restricted to small groups of channels
- To achieve a similar redundancy in an IP system doubling the switch layer is needed (the red and blue layer), increasing the need for a control system to ensure signal routing is correct

Why do we need a Control System in an IP infrastructure? (cont.)

- The SDI router had a fixed relation from source to connection (you plug a source into a physical numbered spigot and the connection is logical)
- In an IP system the sources are not related to a unique input, they are kind of virtual and can exist on virtual any physical port
- This means you need a complete new approach to detect the source (and destination) and perform the enumeration into an operational understandable format
- Especially when sources and destinations are dynamically changed

Early implementations of IP “control systems”

- The first systems that enabled routing in an IP environment were:
  - Vendor specific
  - Not easy to integrate third party devices
- Second generation systems
  - Using multiple proprietary protocols to control a ‘route’
  - Differing methods of control (SDP Session Description Protocols, discreet IP address / port / origin objects, native methods/formats or static addresses/ports)
  - Time consuming to configure (long lists of IP-addresses and ports)
  - Not very intuitive
- Hardly any fun …. and actually defeat the promise of a nice new future

Current (less ideal) implementations of IP “control systems”

- Some examples today still show lack of efficiency in setting up and or maintaining the system
- Sometimes layered approaches are in place to get the desired result (this is less ideal and makes error finding more difficult)
- The responsibilities of who controls what is not always clear

Troubleshooting and monitoring

- Today troubleshooting is just following the signal on the single cable.
- Unplug the device and troubleshoot

- In IP this is a completely new challenge
- First you can not unplug a cable as this will not plug into a measurement device and it will affect more than just one signal
- The monitoring therefore needs to be an integral part of the design

Improvements to the above challenges

- AIMS and AMWA helped solving some of these issues
- The use of standardized protocols called NMOS are now in place
- IS-04 is used to auto discover the sources and destinations in a standardized manner
- IS-05 is used to setup connections in the IP infrastructure in a standardized manner
- IS-06 is there to protect the routes that are in place by managing the bandwidth that is needed

AMWA NMOS IS-04/05 – IP Routing

AMWA **N**etworked **M**edia **O**pen **S**pecifications (NMOS) IS-04/05

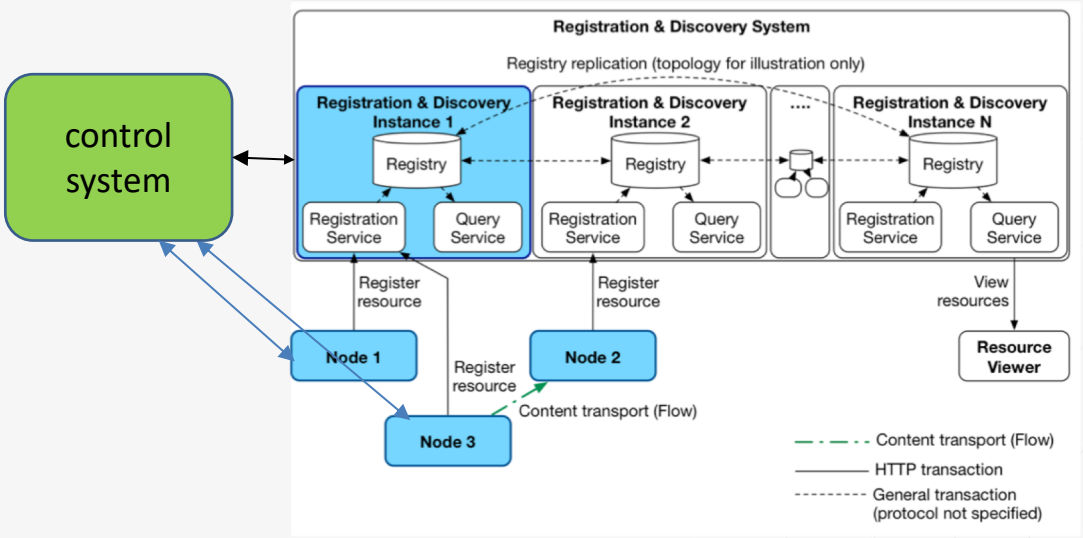
- Auto discovery of device/nodes either directly or via another registry and discovery system
- Ability to route/subscribe a destination or receiver to a ‘flow’ (stream).

- IS-04/05 is being adopted by many manufacturers as a common standard and is recommended by AIMS.

- The standard is still evolving – some original features have been deprecated.

- No bandwidth management /switch control is included in the standard. This is part of IS-06

AMWA NMOS IS-04/05 – IP node Registration and Discovery and connection management



- More information can be found at:
  github.com/AMWA-TV/nmos

Network Control System

- **NMOS IS-06 Network Control**
  - Currently a working group
  - Detection of network switch/routing devices

- **Arista AMCS extensions**
  - Control flow management
  - Routing of flow from one device to another including specification of bandwidth
  - Independent of IGMP – uses static routing

Network Control System

Software Defined Network (SDN)

- There are different definitions of what an SDN means
- Switch vendors like Arista, Cisco, Juniper, Mellanox are not standing still..
  - They have a good awareness of the problems that media flows have caused
  - Control of media flows and bandwidth are being addressed and standardised over time using different protocols. These protocols are still evolving
- A Broadcast control system with agnostic network management layer APIs can give best of breed choices

Network Control System

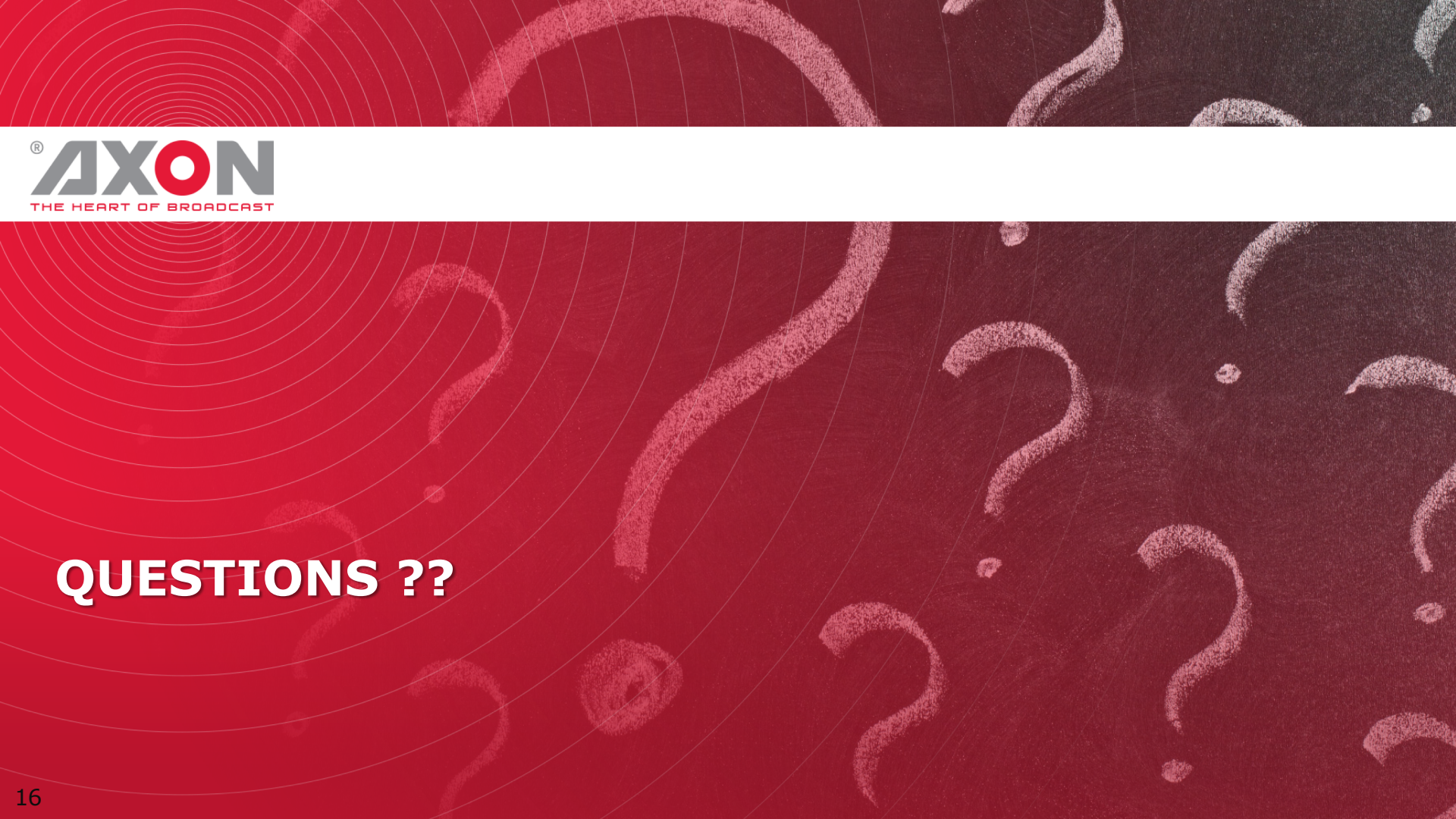
Additional functionality useful in an IP Broadcast Control System

- Management of IP address/ports – auto configuration where possible especially in dynamic system infrastructure
- Authorisation of devices / Security / Enabling of ports/traffic, rules
- Redundancy of critical transmission routes / paths
- Re-routing of paths if device/network is lost, re-located, re-cabled
- Monitoring of vital status / statistics in understandable and accessible way for operational / engineering staff
- Link to the device using its native device protocol – in order to control device parameters like proc amp, shuffling, gain, delay… etc

So why do we need a Control System in an IP infrastructure?

All the previous arguments are responsible for the fact that in an IP centric infrastructure you need a clever, easy to operate and flexible control system…..

A system that uses the NMOS protocols and a system that talks to all instances of the infrastructure by native (vendor specific) protocols.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