BEST PRACTICES ON PTP AND MEDIA FLOW MONITORING FOR ALL-IP INFRASTRUCTURES

Albert De Witt – Regional Account Manager ANZ

Skyline Communications

albert.de.witt@skyline.be
+61 400 869 039

IP SHOWCASE THEATRE AT METexpo 17-19 July 2019

INTRODUCTION

Our company: Skyline Communications

- established in 1985, independent
- headquartered in Izegem, Belgium
- global presence (19 international sites)
- 300+ employees
- acknowledged expert in e2e monitoring & orchestration

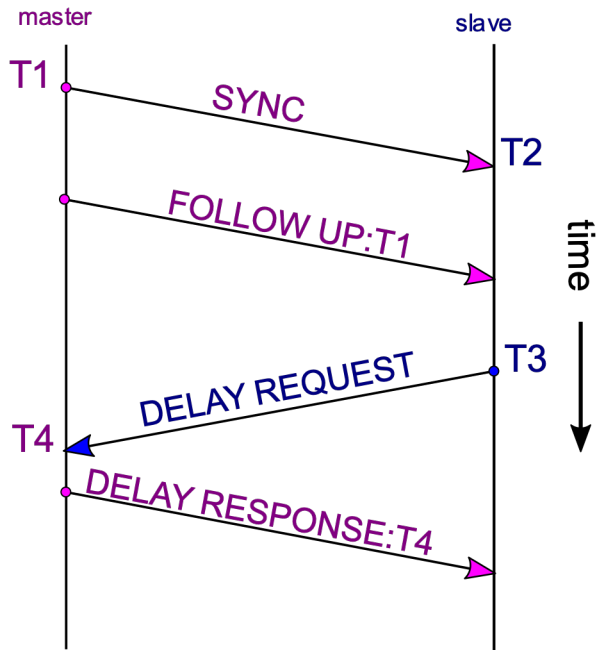
Our product: DataMiner

- Next generation multi-vendor off-the-shelf NMS, Orchestrator & OSS platform
- monitors, controls, orchestrates
- 6000+ systems deployed
- 5500+ drivers to interface with products from 600+ vendors

PTP – A PROTOCOL, NOT A SIGNAL

PTP standard has been designed for engineered environments and makes some assumptions

- no packet delay variation (PDV)
- no assymetry (internal assymetry, transmission assymetry)
- timestamps are perfect



mechanisms to alleviate these sources of errors

- create timestamps in hardware
- use QoS to prioritize PTP traffic
- chose between BC, TC, E2E, P2P, correct timing intervals, etc.. to optimize the precision of time at the endpoint

→ but nothing is perfect

PTP – COMMON SOURCES OF ERROR

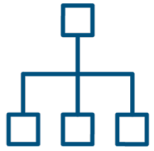
Configuration issues (ordinary clock, grandmaster clock, slave only clock, boundary clock, transparent clock)

- PTP parameters & BMCA settings (domain, priority1, priority2, profiles, delay mechanism …)
- messaging rate intervals (announce message, announce timeout, sync message, delay request, delay response, …)
- communication mode (unicast, multicast, mixed)

Device issues

- grandmaster, boundary clock failure
- loss of external reference
- badly implemented BMCA, PTP master election process

→ automate PTP configuration



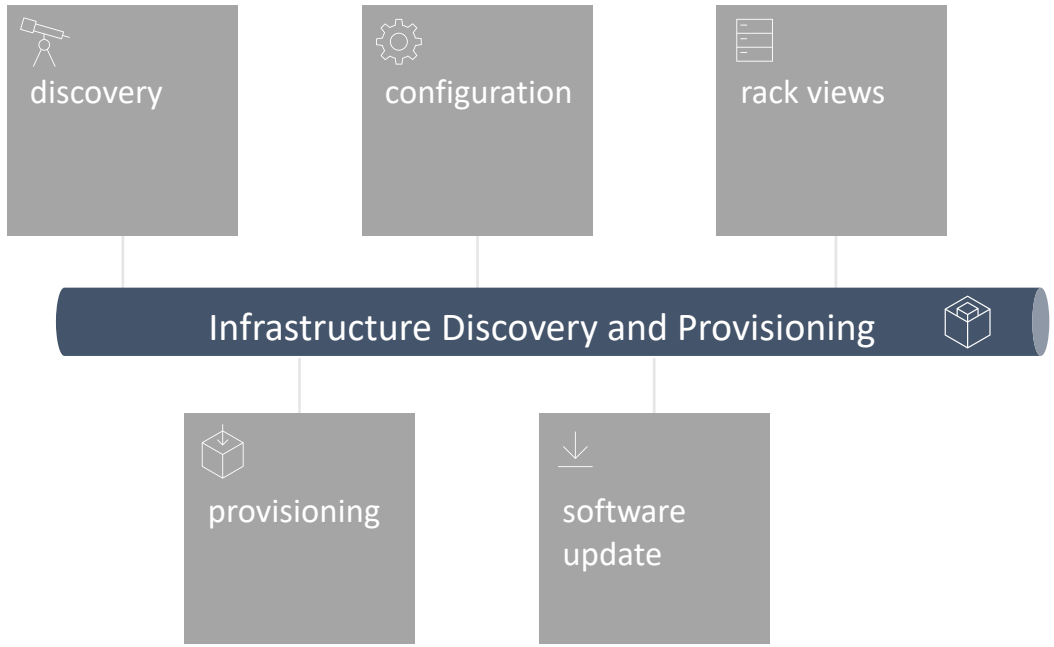
Network issues

- missing event messages
- corrupted event messages
- increased packet delay variations (PDV)
- network assymetry
- multicast issues

→ monitor & control PTP environment

AUTOMATED PTP PROVISIONING

- automatically detect ANY new PTP aware devices (IS-04 / proprietary protocols) – FUTURE PROOF
- automatically extract e2e PTP topology (LLDP)
- apply standard PTP settings/profiles to ANY grandmaster, switch, slave device
- compare PTP configurations
- define and apply “golden” configurations



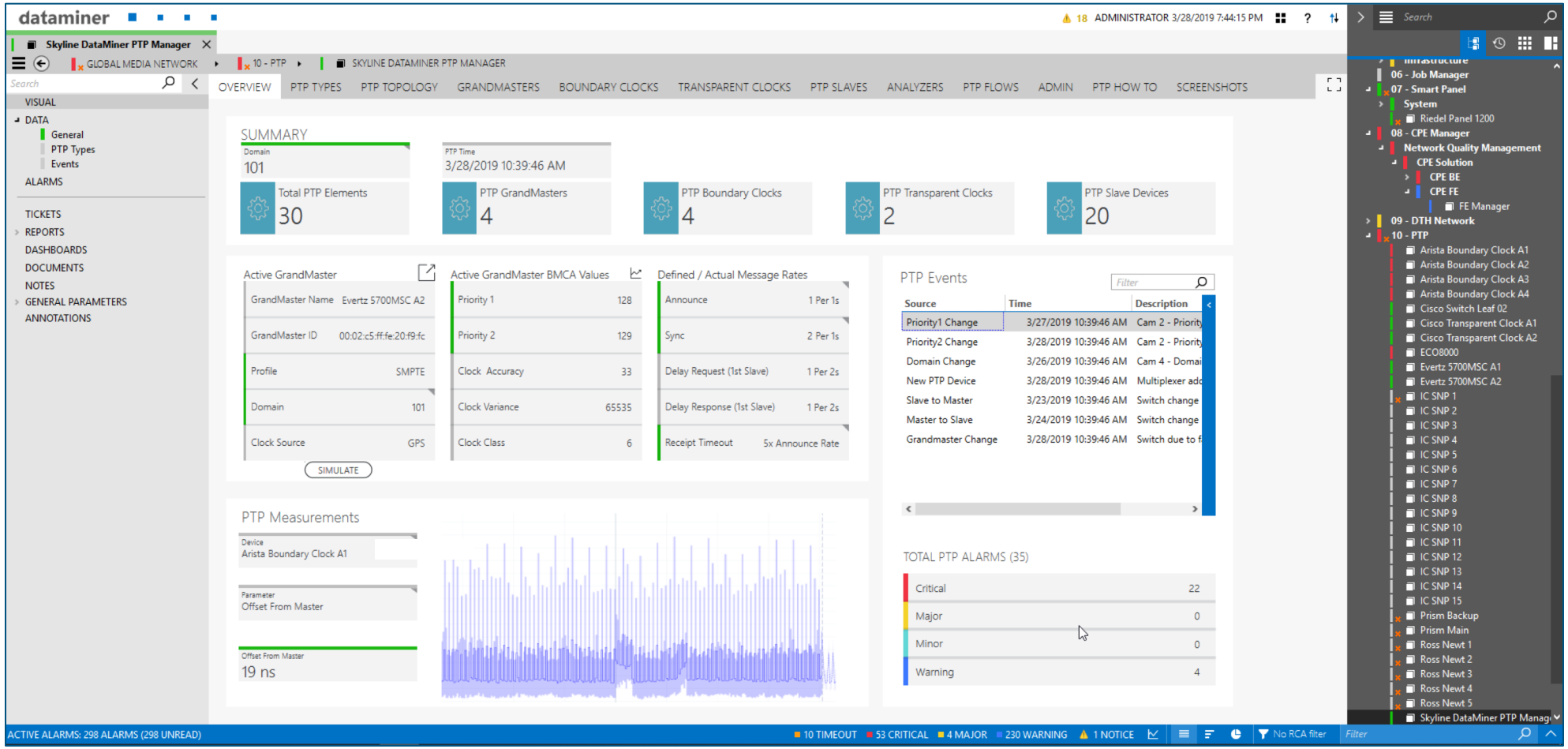
dataminer
infrastructure discovery and provisioning

360° PTP MONITORING & CONTROL

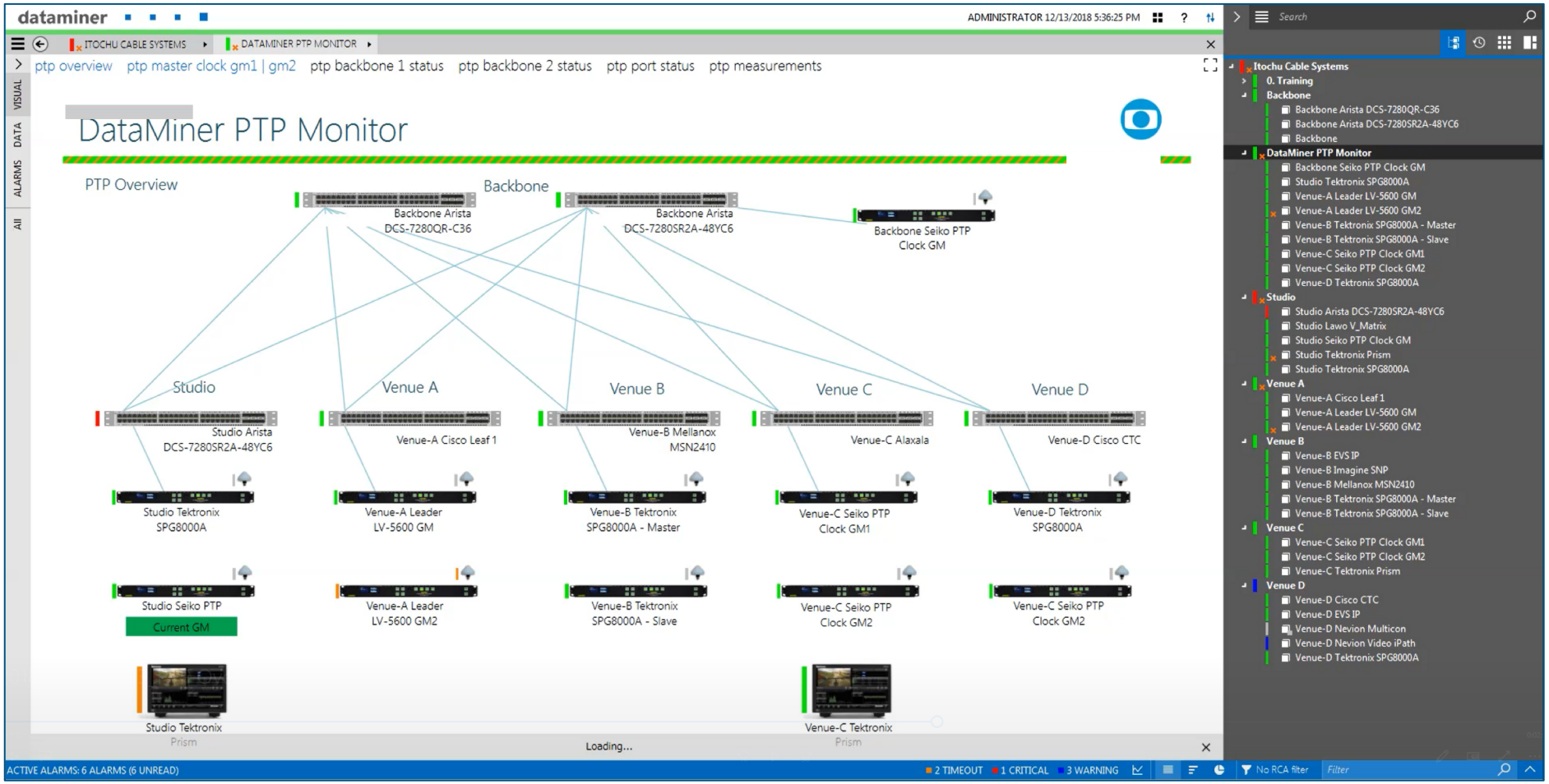
- monitor every single PTP metric on all PTP grandmasters, PTP masters, PTP slaves
- monitor PTP performance (e.g. PTP offset, PTP mean path delay)
- monitor PTP multicast-traffic (network packets as well as switch tables)
- apply PTP security workflows (e.g. block PTP slave devices to never become a master)
- integrate network analyzers

dataminer
monitoring & control

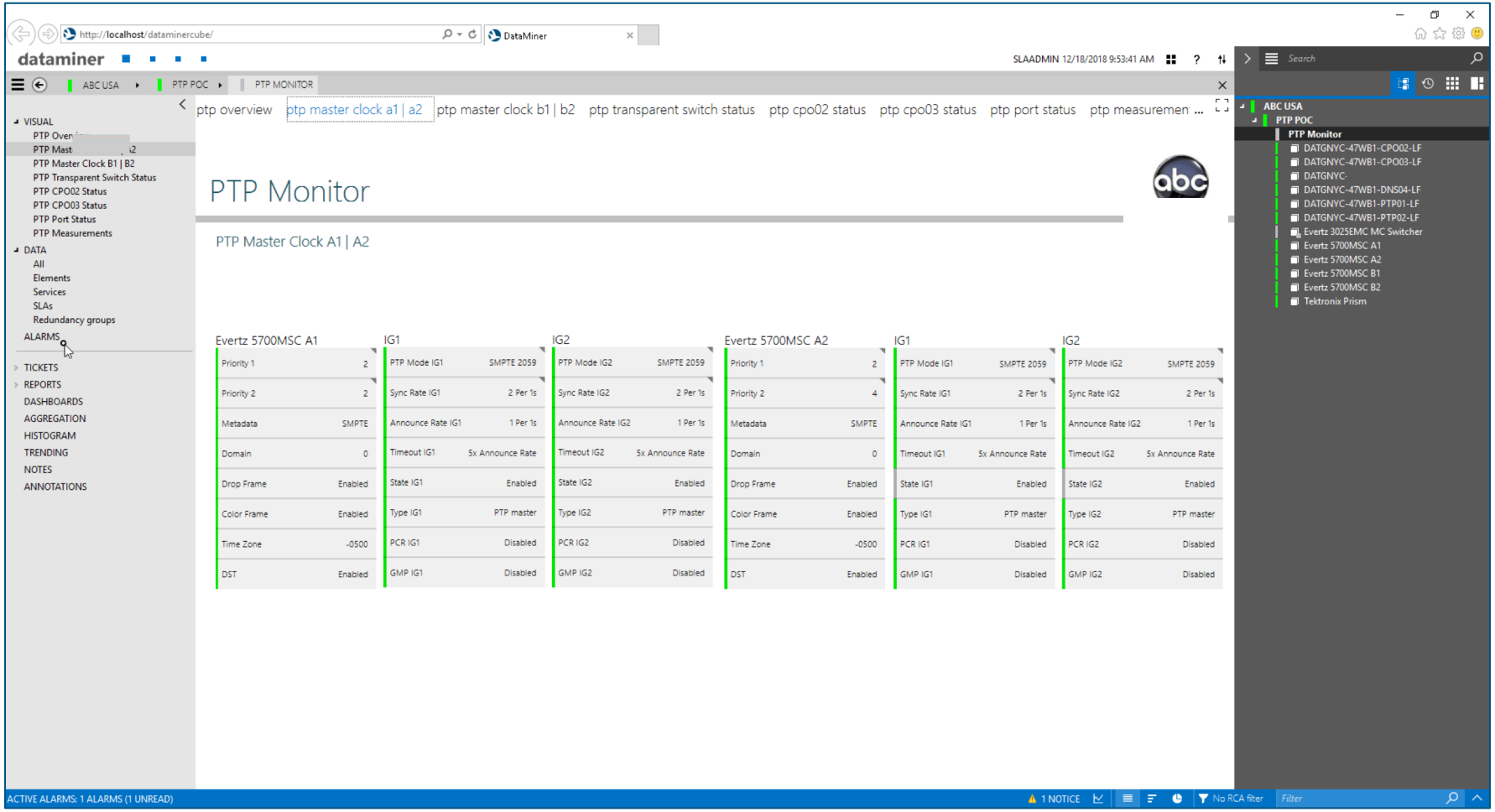
PTP OVERVIEW



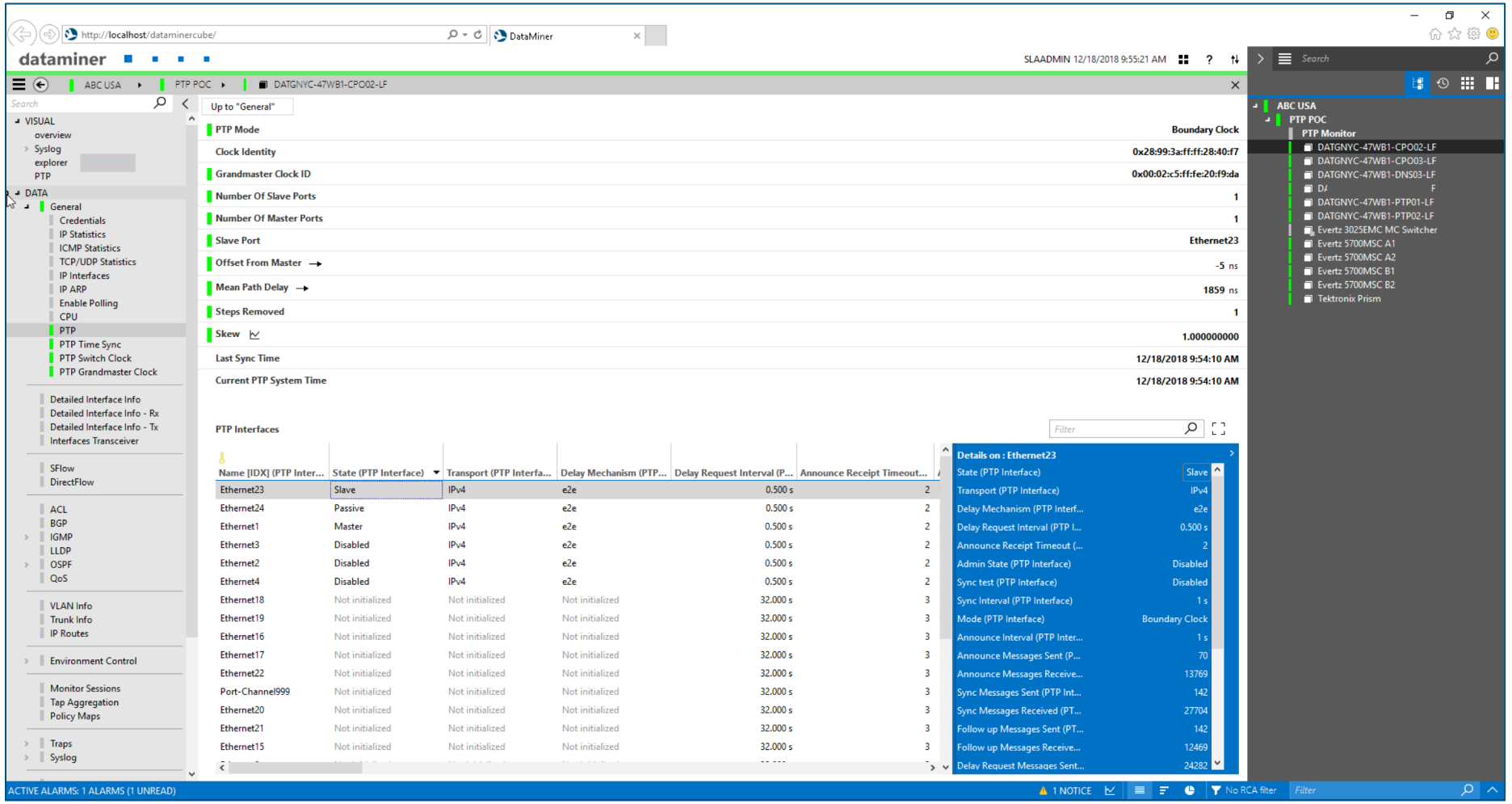
PTP TOPOLOGY



PTP COMPARISON



PTP DETAILS

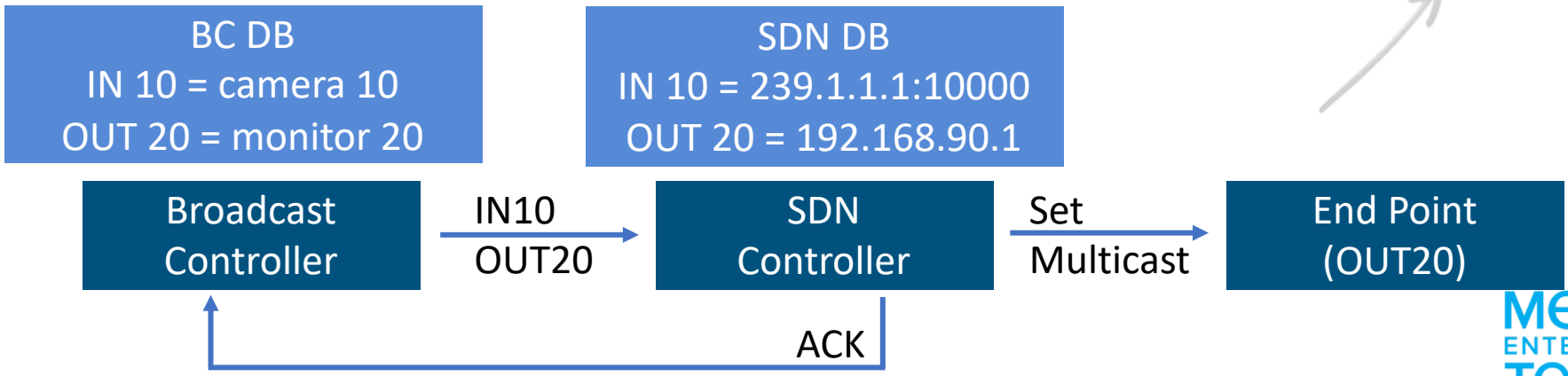

http://localhost/dataminercube/
DataMiner
dataminer
SLAADMIN 12/18/2018 9:55:21 AM
ABC USA
PTP POC
DATGNYC-47WB1-CPO02-LF
Up to "General"
PTP Mode
Boundary Clock
Clock Identity
0x28:99:3a:ff:ff:28:40:f7
Grandmaster Clock ID
0x00:02:c5:ff:fe:20:f9:da
Number Of Slave Ports
1
Number Of Master Ports
1
Slave Port
Ethernet23
Offset From Master
-5 ns
Mean Path Delay
1859 ns
Steps Removed
1
Skew
1.000000000
Last Sync Time
12/18/2018 9:54:10 AM
Current PTP System Time
12/18/2018 9:54:10 AM
PTP Interfaces
Name [IDX] (PTP Inter...
State (PTP Interface)
Transport (PTP Interfa...
Delay Mechanism (PTP...
Delay Request Interval (P...
Announce Receipt Timeout...
Ethernet23 Slave IPv4 e2e 0.500 s 2
Ethernet24 Passive IPv4 e2e 0.500 s 2
Ethernet1 Master IPv4 e2e 0.500 s 2
Ethernet3 Disabled IPv4 e2e 0.500 s 2
Ethernet2 Disabled IPv4 e2e 0.500 s 2
Ethernet4 Disabled IPv4 e2e 0.500 s 2
Ethernet18 Not initialized Not initialized Not initialized 32.000 s 3
Ethernet19 Not initialized Not initialized Not initialized 32.000 s 3
Ethernet16 Not initialized Not initialized Not initialized 32.000 s 3
Ethernet17 Not initialized Not initialized Not initialized 32.000 s 3
Ethernet22 Not initialized Not initialized Not initialized 32.000 s 3
Port-Channel999 Not initialized Not initialized Not initialized 32.000 s 3
Ethernet20 Not initialized Not initialized Not initialized 32.000 s 3
Ethernet21 Not initialized Not initialized Not initialized 32.000 s 3
Ethernet15 Not initialized Not initialized Not initialized 32.000 s 3
Details on : Ethernet23
State (PTP Interface) Slave
Transport (PTP Interface) IPv4
Delay Mechanism (PTP Interf... e2e
Delay Request Interval (PTP I... 0.500 s
Announce Receipt Timeout (... 2
Admin State (PTP Interface) Disabled
Sync test (PTP Interface) Disabled
Sync Interval (PTP Interface) 1 s
Mode (PTP Interface) Boundary Clock
Announce Interval (PTP Inter... 1 s
Announce Messages Sent (P... 70
Announce Messages Receive... 13769
Sync Messages Sent (PTP Int... 142
Sync Messages Received (PT... 27704
Follow up Messages Sent (PT... 142
Follow up Messages Receive... 12469
Delay Request Messages Sent... 24282
ACTIVE ALARMS: 1 ALARMS (1 UNREAD)
1 NOTICE
No RCA filter

PTP PERFORMANCE DATA

IP MEDIA FLOW TRACKING

- network is a shared & non-linear medium (vs single SDI cable)
- complex switch fabrics (vs single SDI router)
- multiple ST2110 essence streams (vs single SDI signal)
- SDN controllers talk to plenty of end points (vs single SDI router)
- broadcast and SDN controllers still use „classic“ SDI router protocols

what if the BC-controller panel shows a connection but the screen stays black?



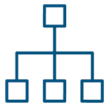
IP MEDIA FLOWS – SOURCES OF ERRORS

Controller

- wrong DB entries (initial setup, device replacement, IS-04 querier issue)
- BC-controller and SDN controller DBs are out of sync

Source

- source not active, not streaming
- wrong IP(s) or multicast transmit address(es)



Network

- IGMP join / leave issues
- static multicast issues
- source specific multicast issues
- oversubscription (ghost streams)

Destination

- IGMP join not sent
- wrong multicast receive address(es)

track your media flows in real-time

DATAMINER MEDIA FLOW MONITORING SOLUTION

read crosspoint status from SDN controller

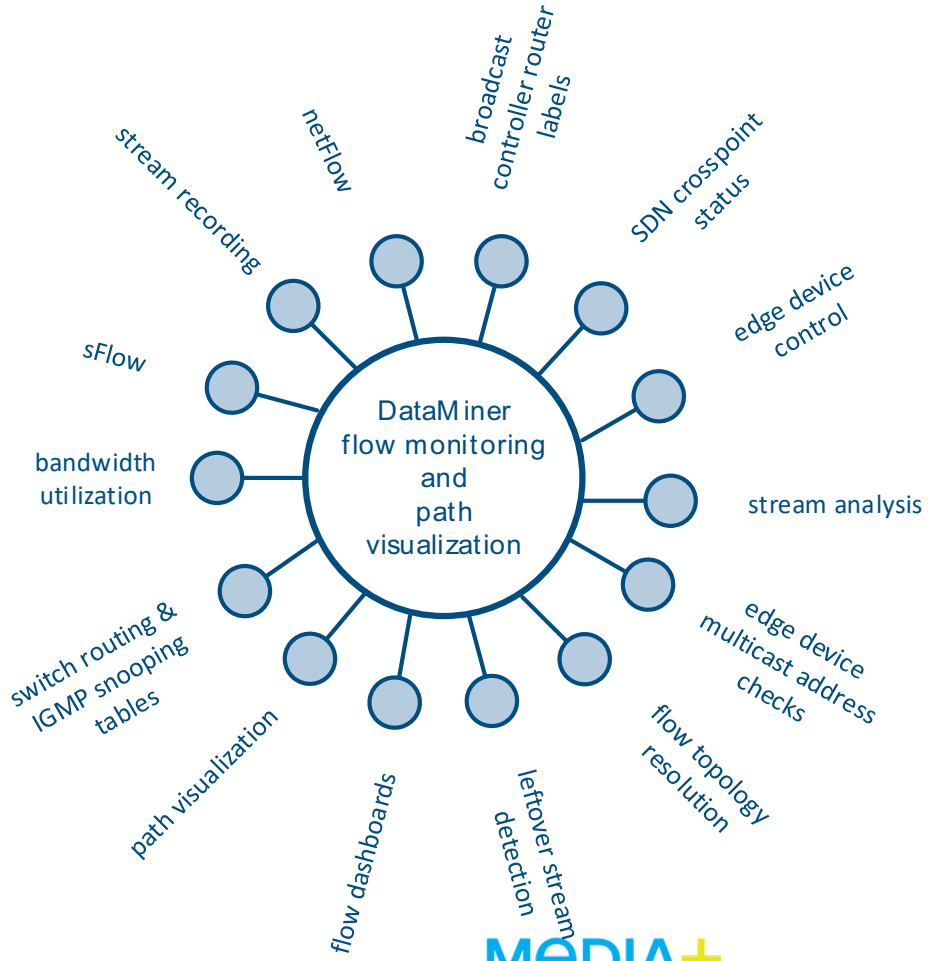
"where are all my flows supposed to be?"

check this status versus the real-time situation

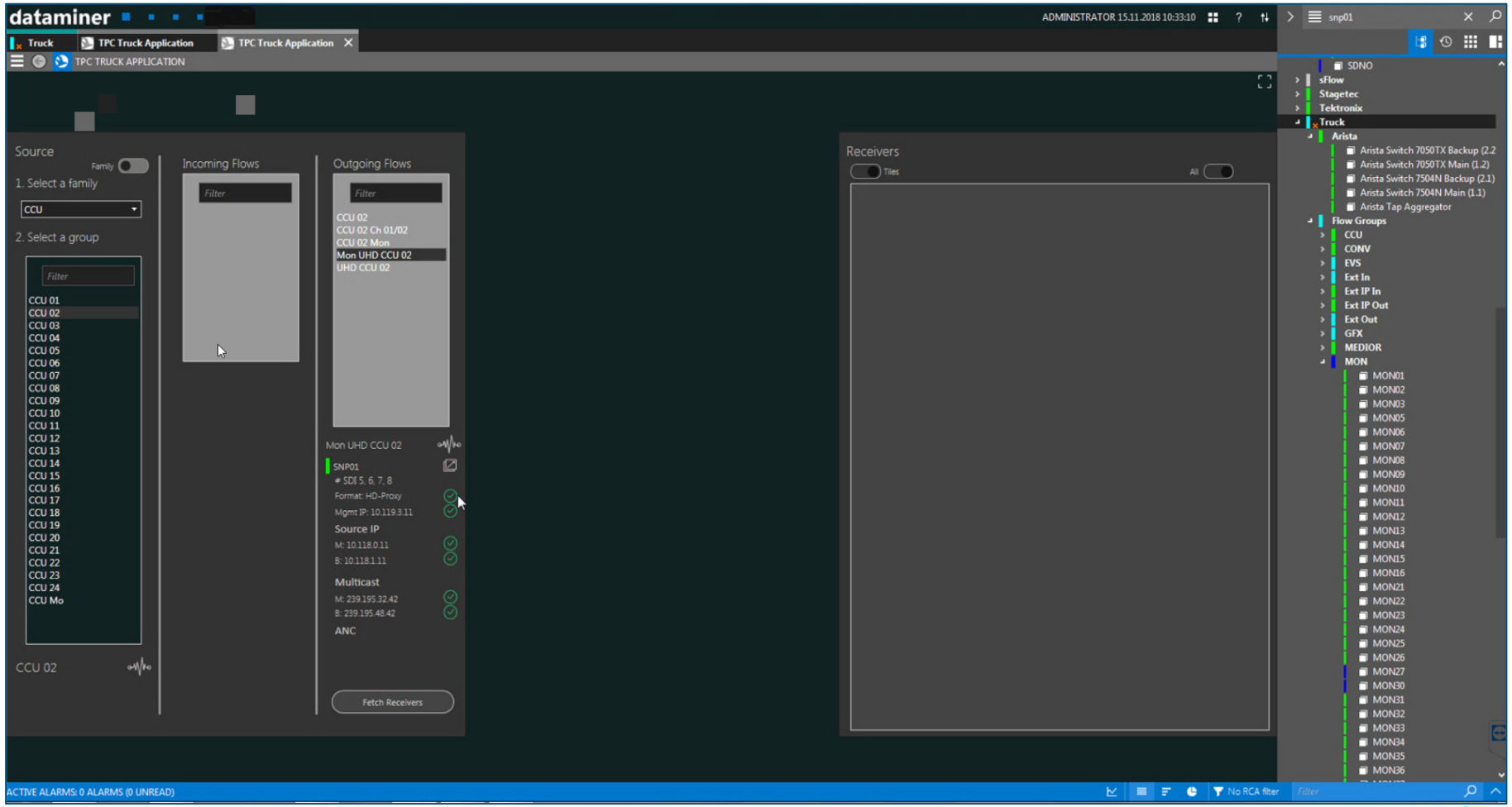
"where are my flows in reality?"

AND detect the flows which are there but should not be there

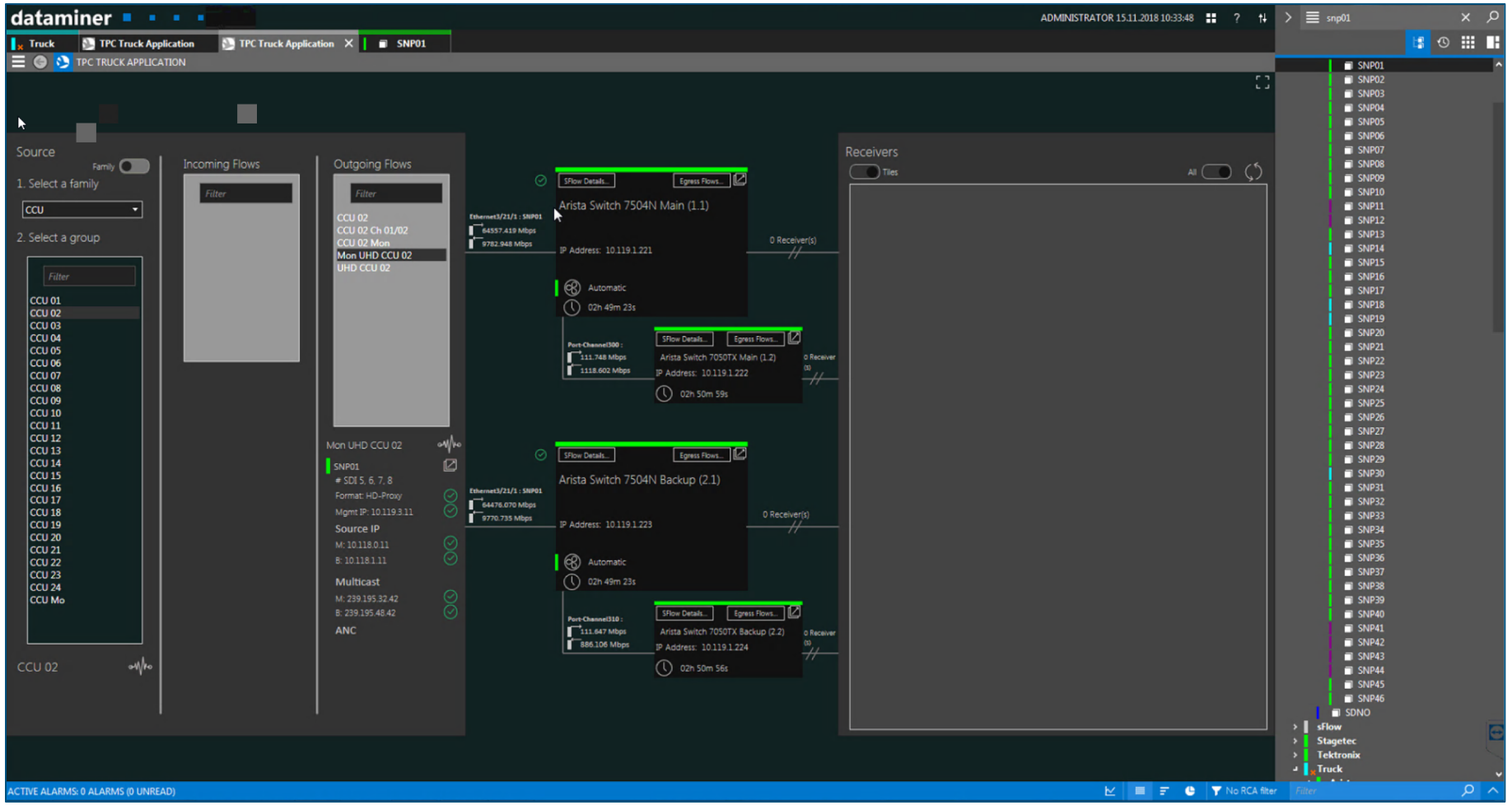
gather real-time information from source to destination:
„crawl" through the network and find the root cause of any stream issue



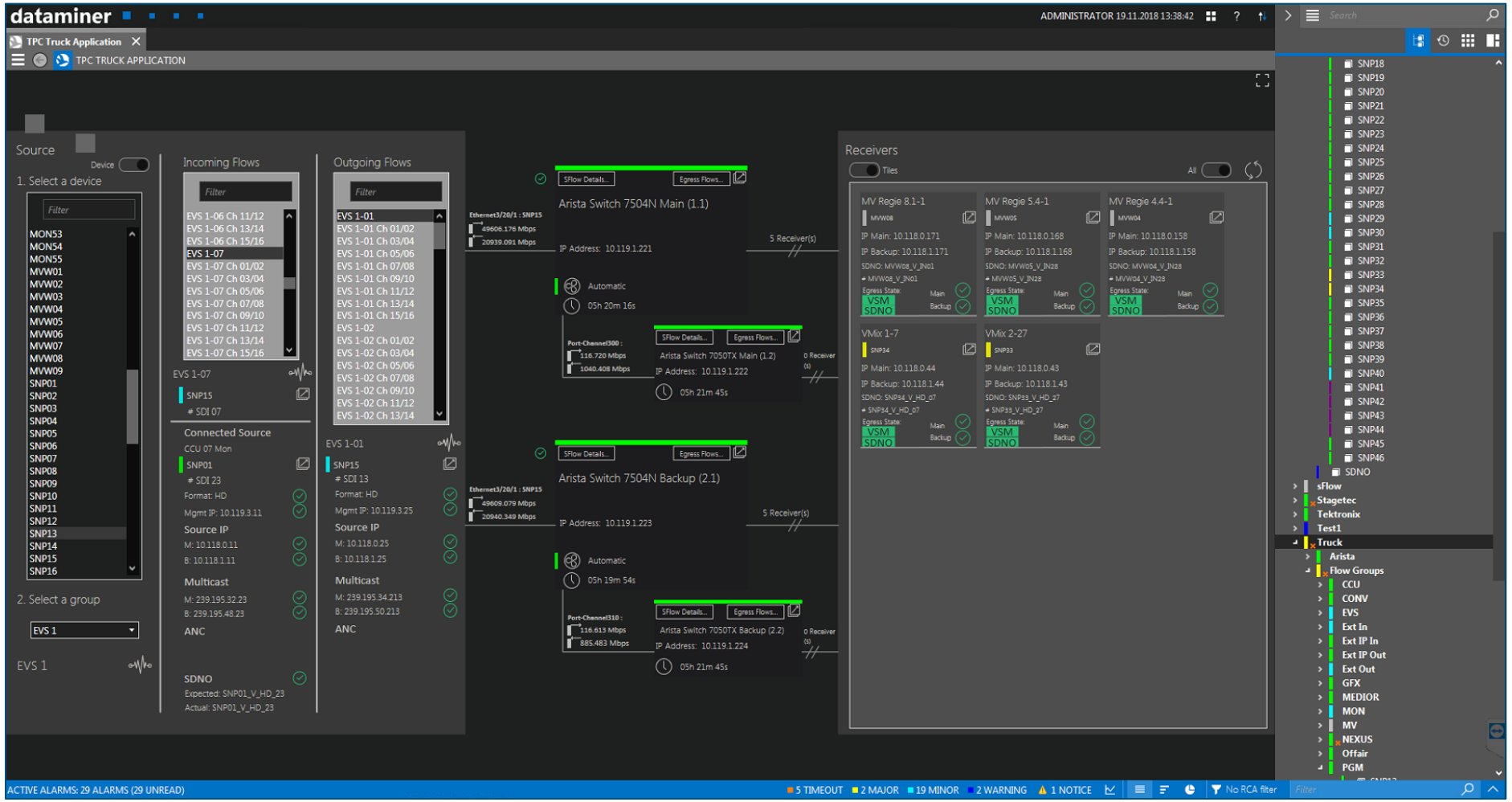
START WITH THE SOURCE



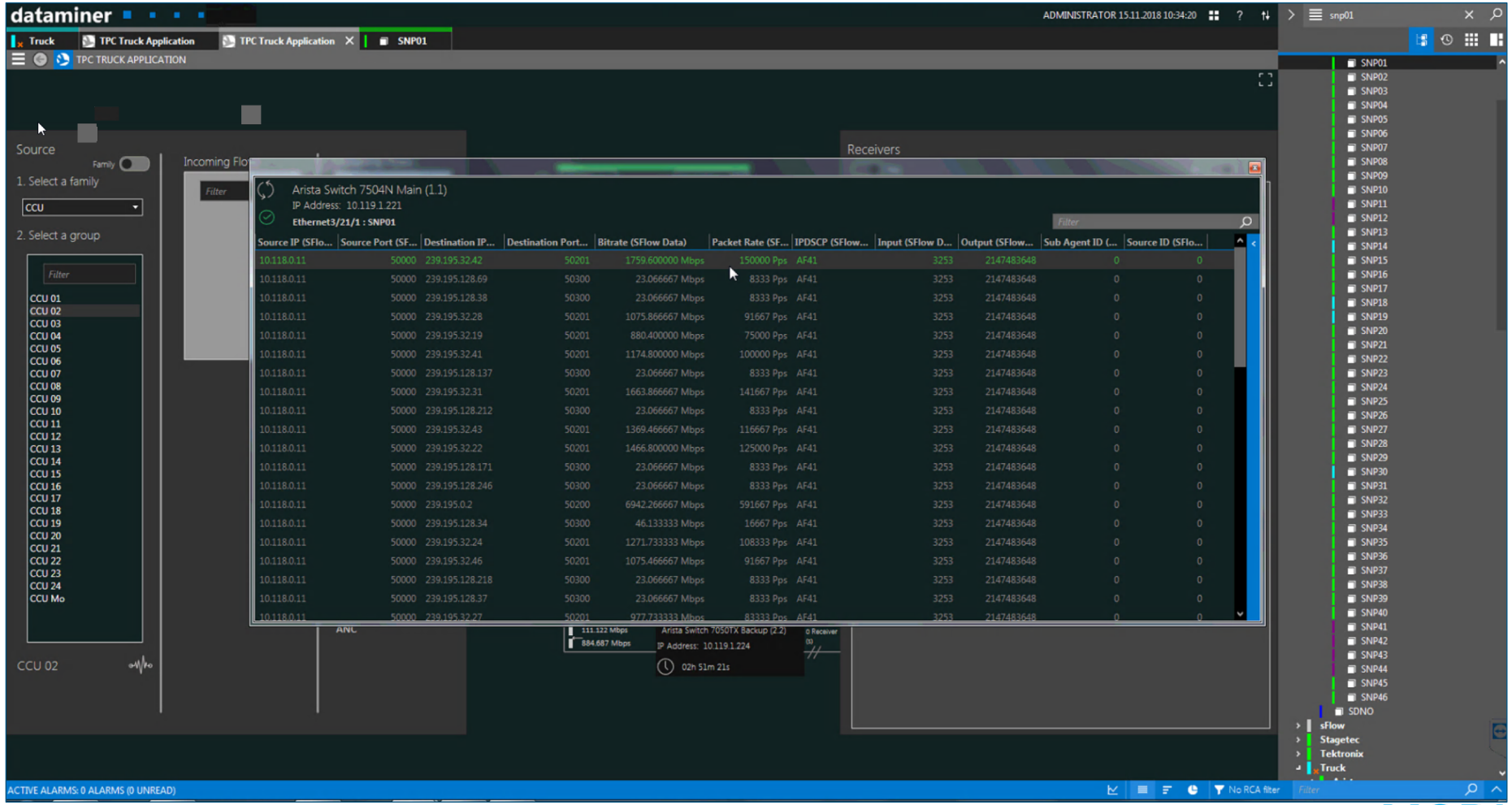
RESOLVE TOPOLOGY



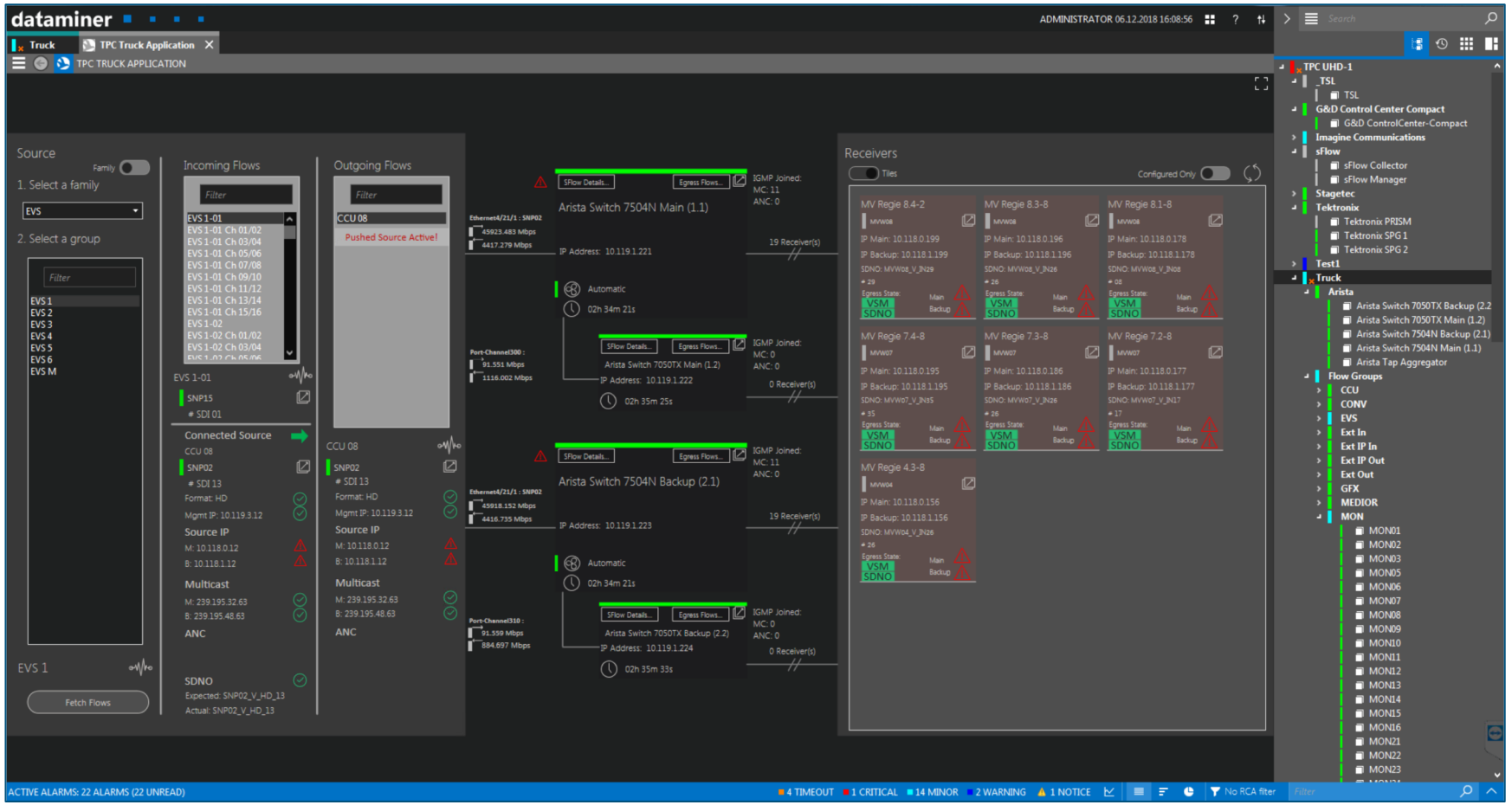
CHECK DESTINATIONS



DRILL DOWN TO DETAILS



CUSTOMER EXAMPLE – STREAM ISSUE



Customer example

EVS1 Input1 has no input signal

check input: CCU08 is the connected source

check CCU08 output: CCU08 is routed to 7 destinations but none of them receive any signal

root cause: wrong source IP – IGMPV3 SSM blocks multicast traffic

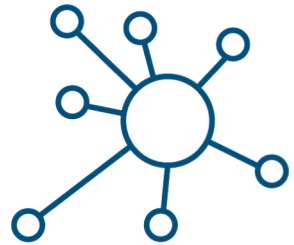
SUMMARY

MONITOR AND MANAGE
YOUR PTP INFRASTRUCTURE
WITH CARE

GO FOR TRUE E2E
SDN ORCHESTRATION
RATHER THAN
SDN CONTROL

Monitor
Control
Orchestrate

TRACK YOUR UNCOMPRESSED
MEDIA FLOWS IN REAL-TIME



Thank You!

Albert De Witt

Skyline Communications

albert.de.witt@skyline.be

+61 400 869 039

www.skyline.be