Timed switch implementation over programmable hybrid pipeline

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The problem and the solution

Why is timed switch needed?

Solving Timed switch with programmable hybrid pipeline

What is salvo use case and why is it a challenge?
Why is timed switch needed?

Pure IGMP based Solution:

Network Controller

\[ \text{Switch (S1,G1, Time}>t1 \rightarrow S3,G3) \]

Multiviewer

\[ \text{Multiviewer} \]

IP Switch

\[ \text{IGMP Join S1,G1} \]

\[ \text{IGMP Join S3,G3} \]

\[ \text{IGMP Leave S1,G1} \]

Frame boundary match point

Aggregated Bandwidth

\[ \text{(S1,G1)} \]

\[ \text{(S2,G2)} \]

\[ \text{(S3,G3)} \]

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IGMP + timed switch Solution:

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Timed switch control plane principals:
- End points use IGMP to join/leave media streams based on controller’s request
- Controller sets on the switch/network (Time, Flows, Downstream interface list)
- New interface for media switch management (should be added to AMWA IS06 or proprietary controller implementations)

Timed switch data plane principals:
- Match on RTP time stamp over SMPTE 2110 media streams
- All media flow time stamps are synchronized/locked. All packets from the same frame carry the same stamp
- Switch between flows at the new timestamp >= value
- Post event, control plane should revert to legacy IGMP based tables

Advantages
- Programmable hybrid pipeline: All the legacy protocols (IGMP/PTP/PIM/...) are operational along the per flow timed switch implementation
- Network/endpoint links carries only relevant data i.e. link can be utilized to carry more streams
- Reduced frame buffer and latency at the endpoints

- Hybrid – the integration between legacy (switch router) and programmable pipeline
- NOS (ONYX) and user applications run in parallel
P4 timed switch/ salvo program

Timed Switch Demo
Switch between 2 streams on frame boundary, every 5 seconds
The Salvo Use Case

- Switch multiple flows at once
- Timed switch can be applied to multiple flows across multiple network devices (switches), at the same frame boundary
- Full SDN solution is preferred over IGMP based
- Millisecond data plane ‘notice’

Thank You

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