



# NMOS Advanced Streaming Architecture Natural Groups and more ...

Alain Bouchard, ing



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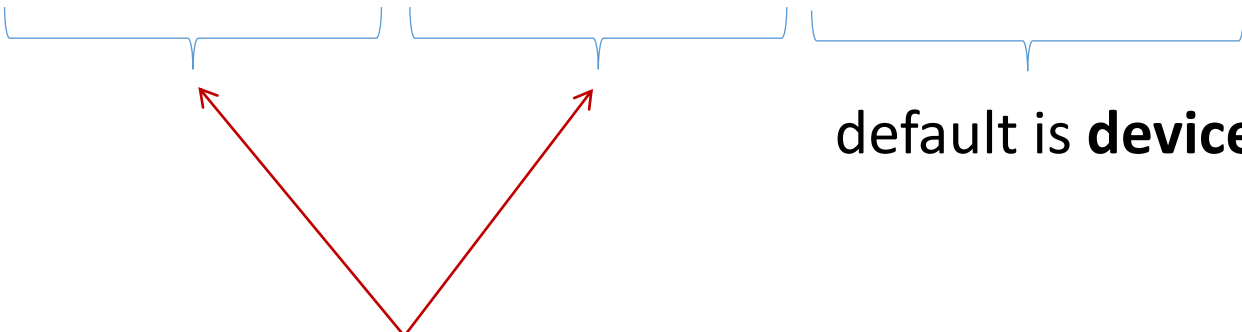
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# Public GitHub Repository

- <https://github.com/alabou/NMOS-MatroxOnly>
  - README.md
  - NMOS With Natural Groups.md
  - One Model to Rule them All.md

# BCP-002-01

- "tags": {  
  "urn:x-nmos:tag:grouphint/v1.0":  
    [ "<group-name>:<role-in-group>[:<group-scope>]" ]  
  }  
      
    default is **device**

This definition is not precise enough

- Resources within the same group **MUST** use the role to differentiate themselves.
- Roles **MUST** be unique within the same group.

# grouphint with Matrox precisions

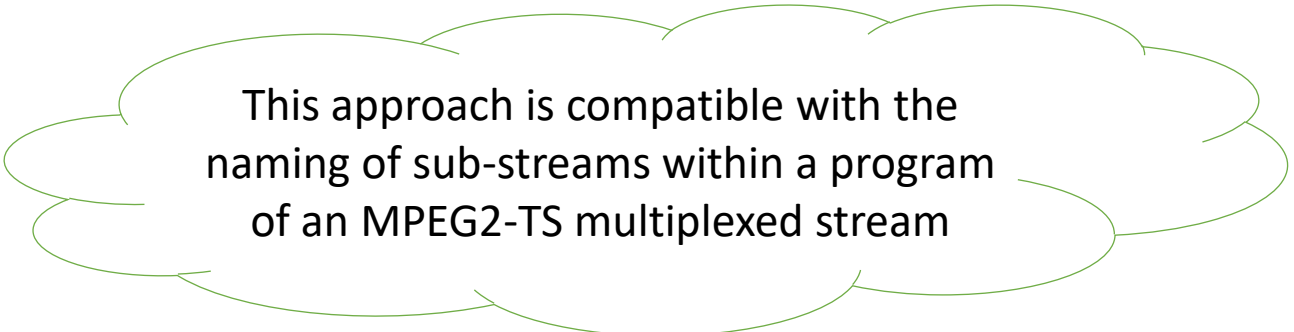
- "tags": {  
  "urn:x-nmos:tag:grouphint/v1.0":  
    [ "<group-name> <group-index>:<role-in-group> <role-index>" ]  
  }  
    Transport Name      0 .. N      AUDIO      0 .. N  
   VIDEO  
   DATA  
   MUX      layer  
   format

Matrox prohibit using group-scope  
=> implicitly always **device**

This definition is fully precise and compatible with BCP-002-01

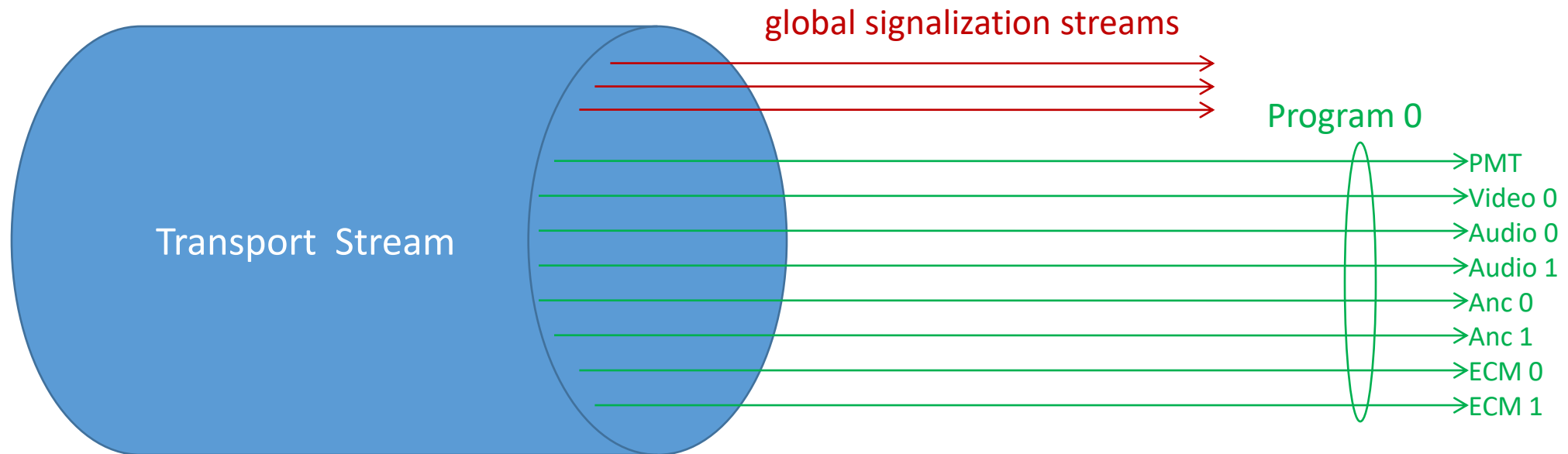
# Layer

- <role-index> defines the layer within a given format family
  - For “urn:x-nmos:format:audio”
    - “AUDIO 0” refers to essence at layer 0 within the audio family
    - “AUDIO 1” refers to essence at layer 1 within the audio family
  - For “urn:x-nmos:format:video”
    - “VIDEO” refers to essence at layer 0 within the video family



This approach is compatible with the naming of sub-streams within a program of an MPEG2-TS multiplexed stream

# MPEG2-TS transport stream



Naming within a program is obtained using the `stream_type` (video, audio, anc, etc) and the ordering of the streams of a given `stream_type` within the PMT (0, 1, etc).

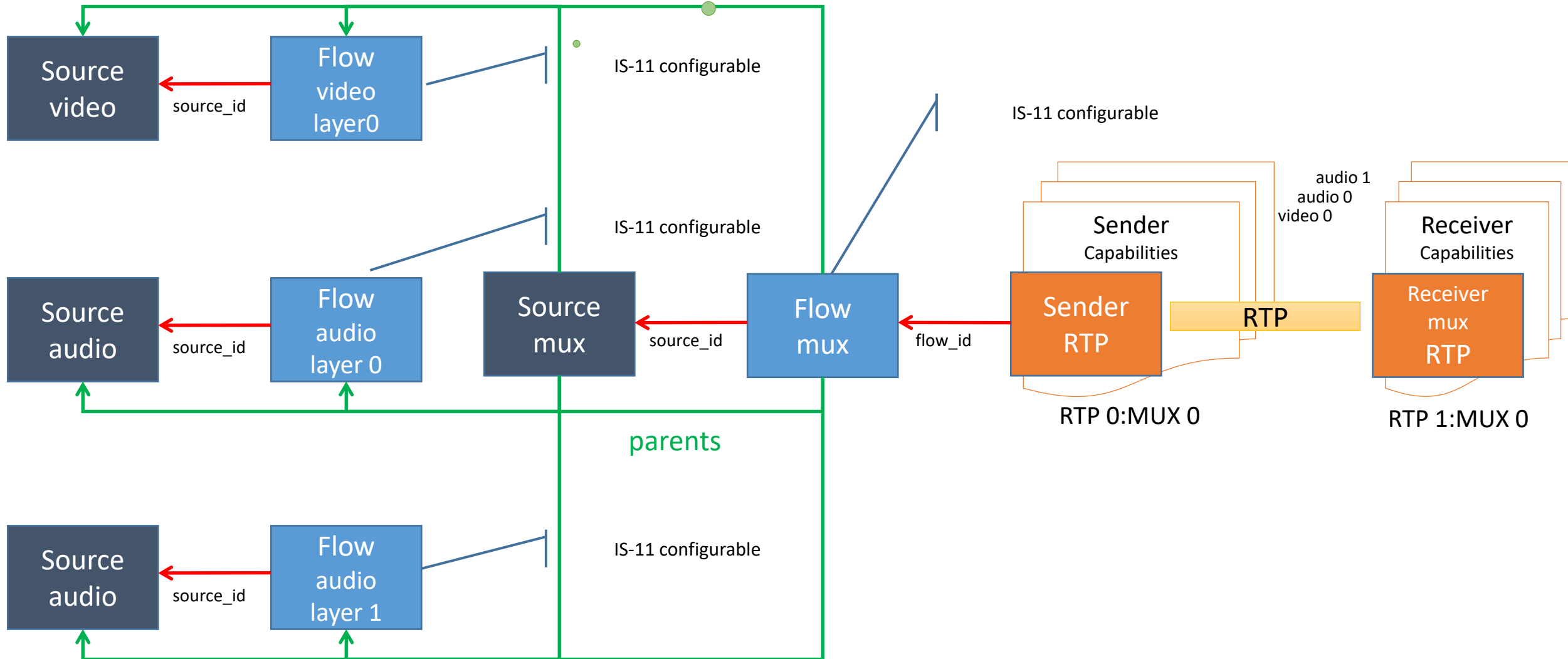
`stream_type == format, ordering == layer`

# Sub-Streams

- Sub-Streams are sub-Flows in an NMOS topology
  - Sub-Flows are “parents” of a “mux” Flow.
    - A sub-Flow has format and layer attributes.
- A vendor-specific mechanism establishes the topology
  - Routing essences from Sources to Senders through Flows
- A standard IS-11 mechanism configures the Flows
  - IS-11 Sender’s active constraints

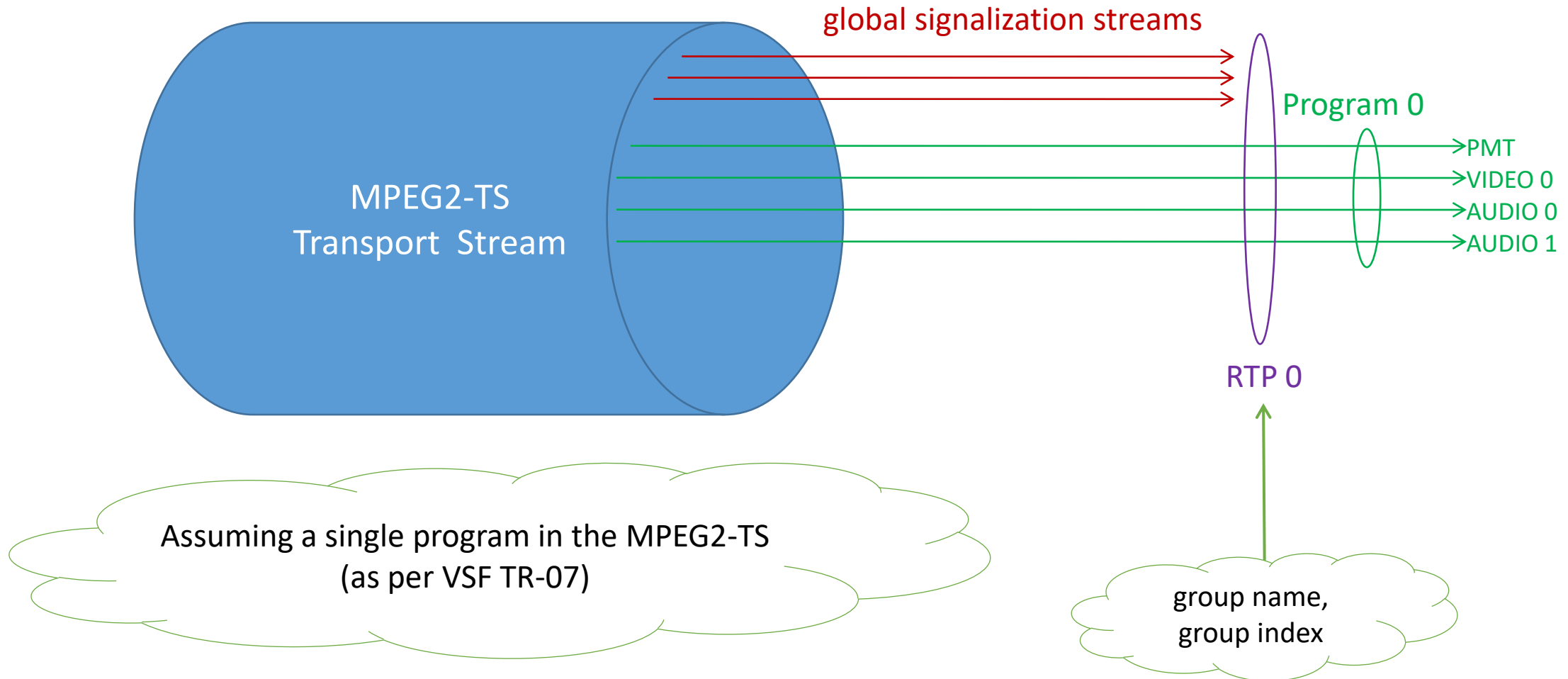
# MPEG2-TS stream over RTP

Explicit Layer from Flow





# Transport stream

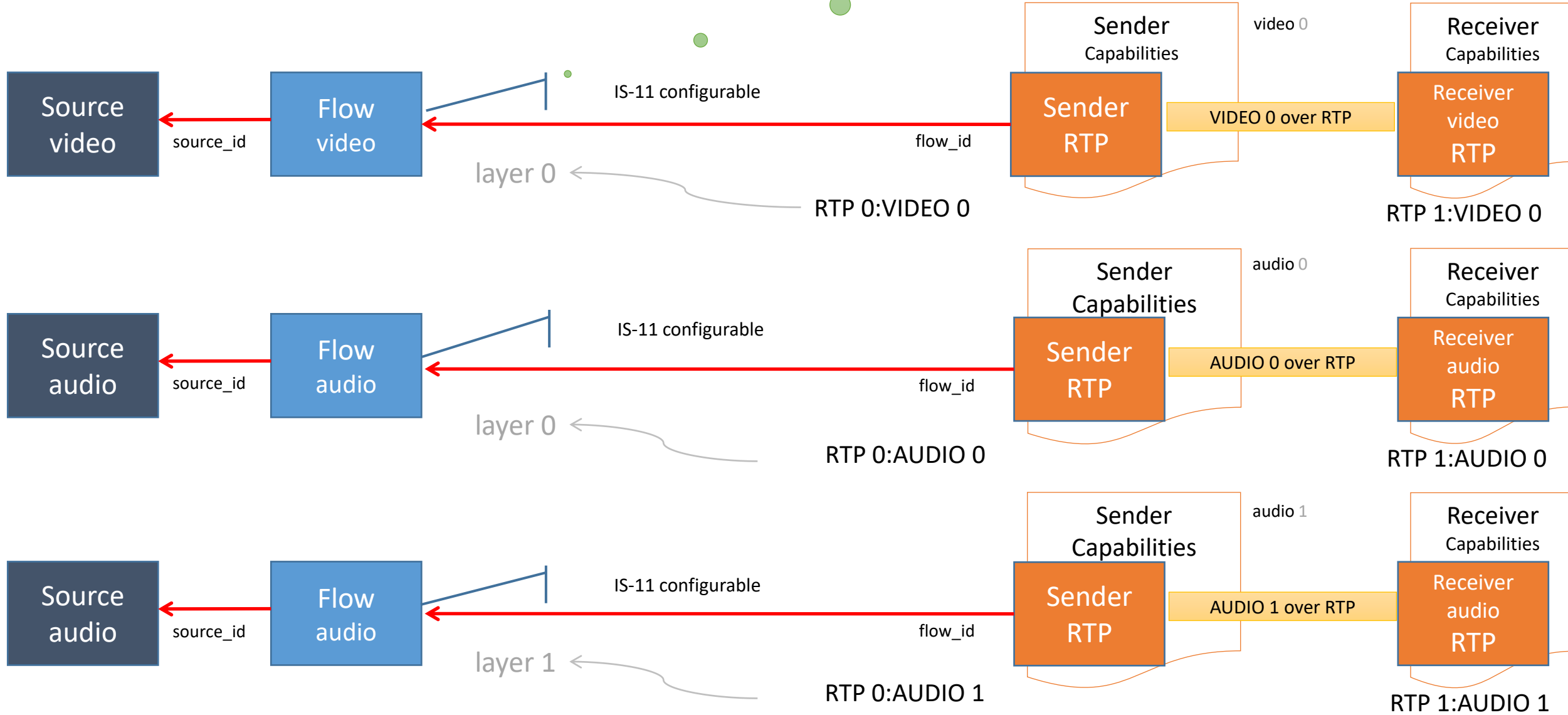


# Independent Streams

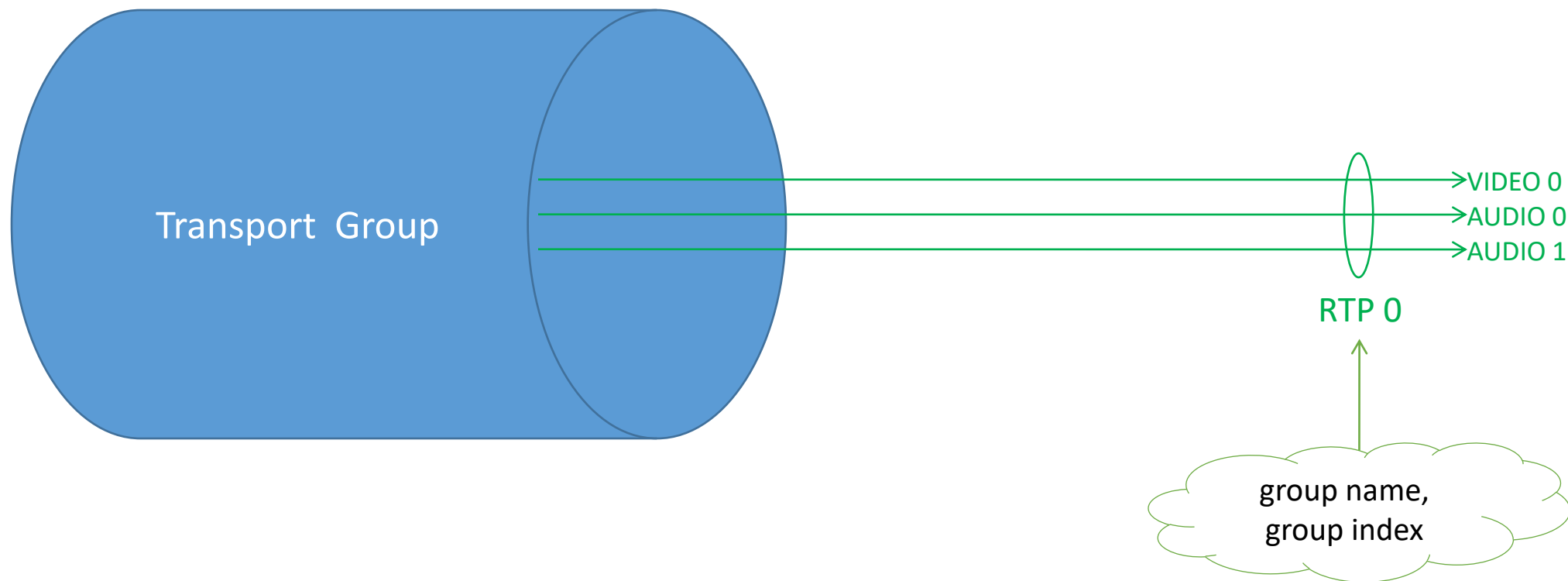
- Independent streams are Flows in an NMOS topology
  - Independent Flows are **not** “parents” of a “mux” Flow.
    - A independent Flow has a format attribute but **no** layer attribute.
      - Layer implicitly defined by Sender’s role-index
- A vendor-specific mechanism establishes the groups (topology)
  - Routing essences from Sources to Senders through Flows
- A standard IS-11 mechanism configures the Flows
  - IS-11 Sender’s active constraints

# Independent Streams over RTP

Implicit Layer from role-index



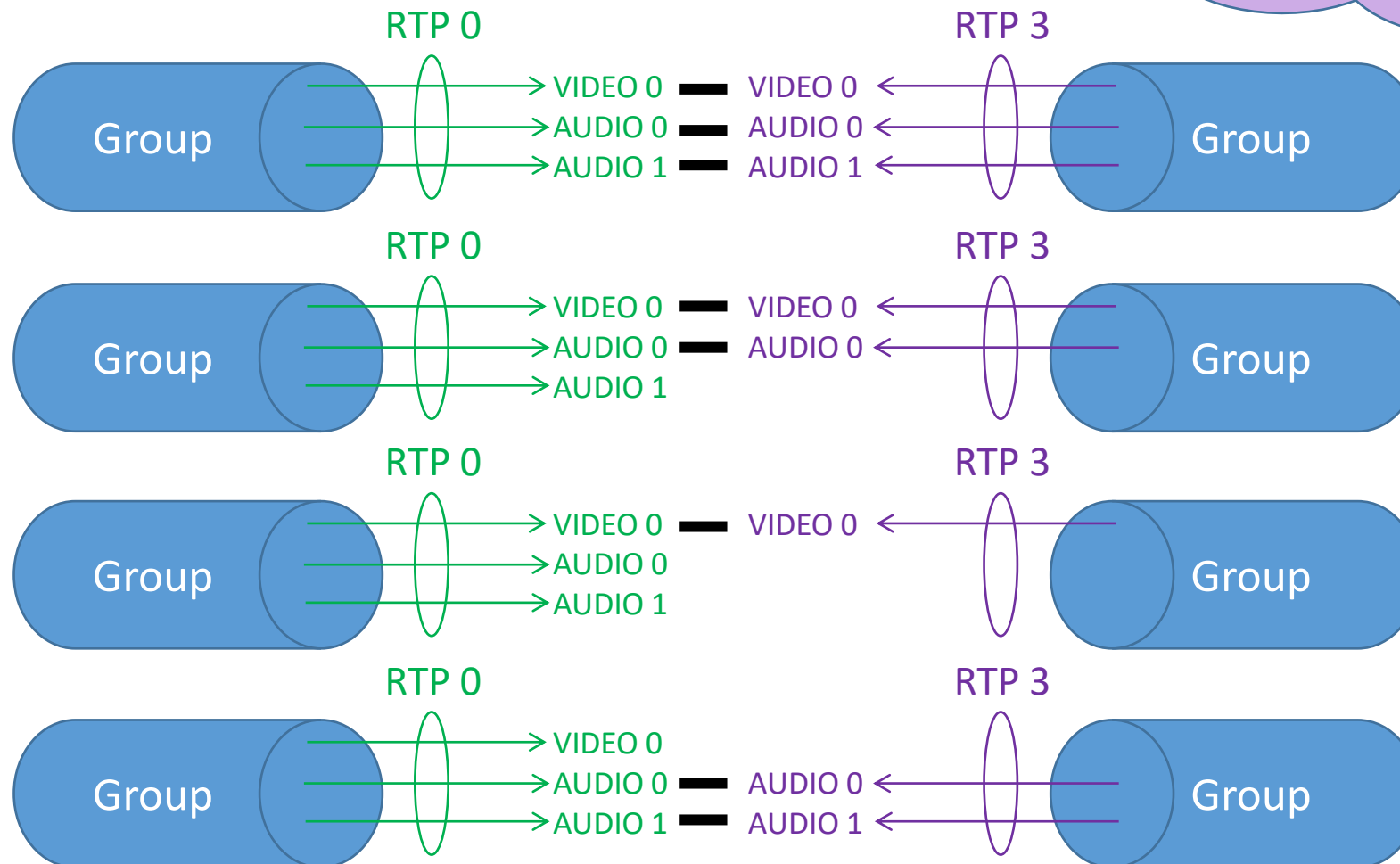
# Transport group



# Direct interconnect (default)

Select a group on the Receiver.  
Select a group on the Sender.

Connect same:  
role-in-group and role-index



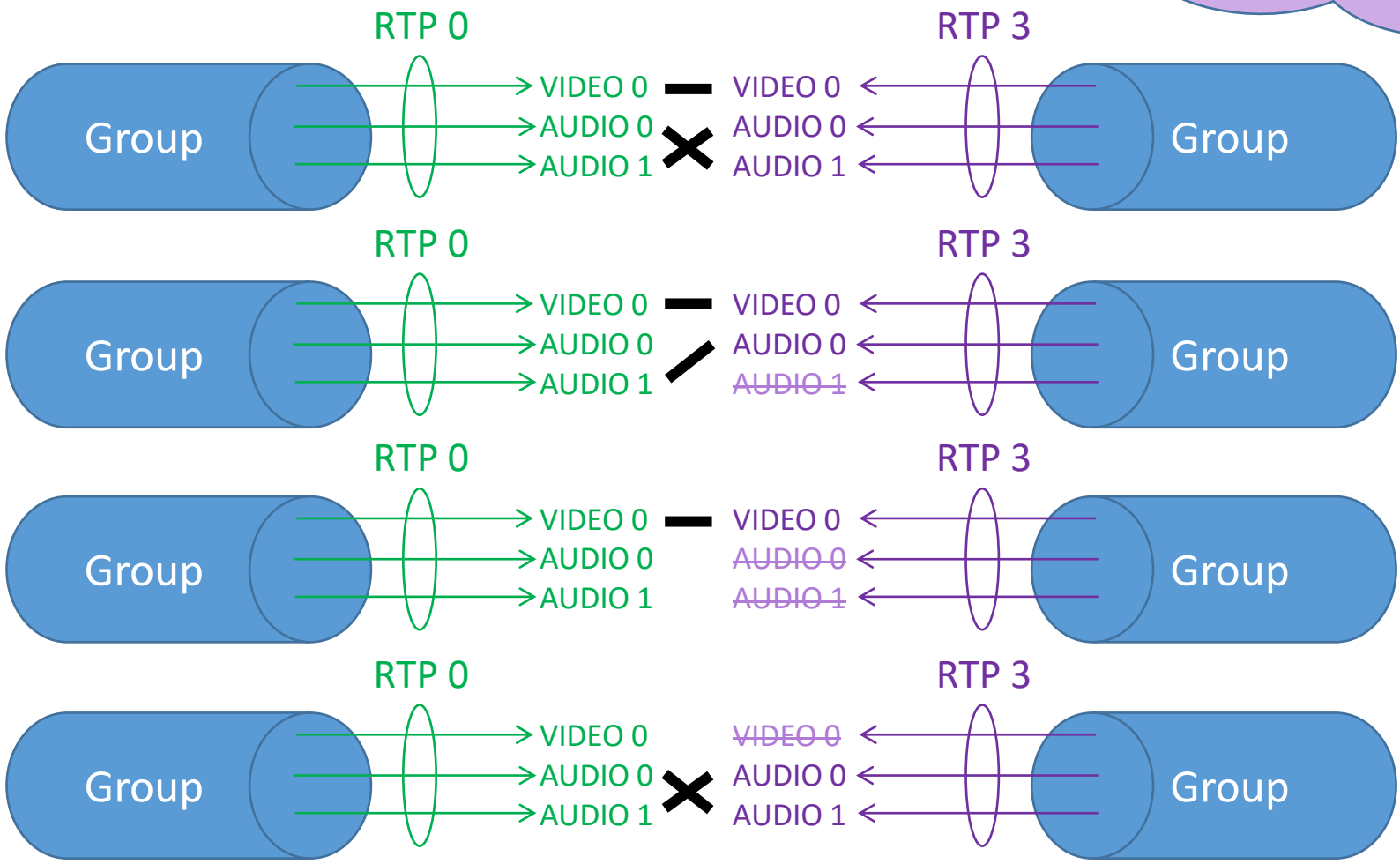
Skip last  
role-indices of  
a family

Skip complete  
families

# Remapped interconnect

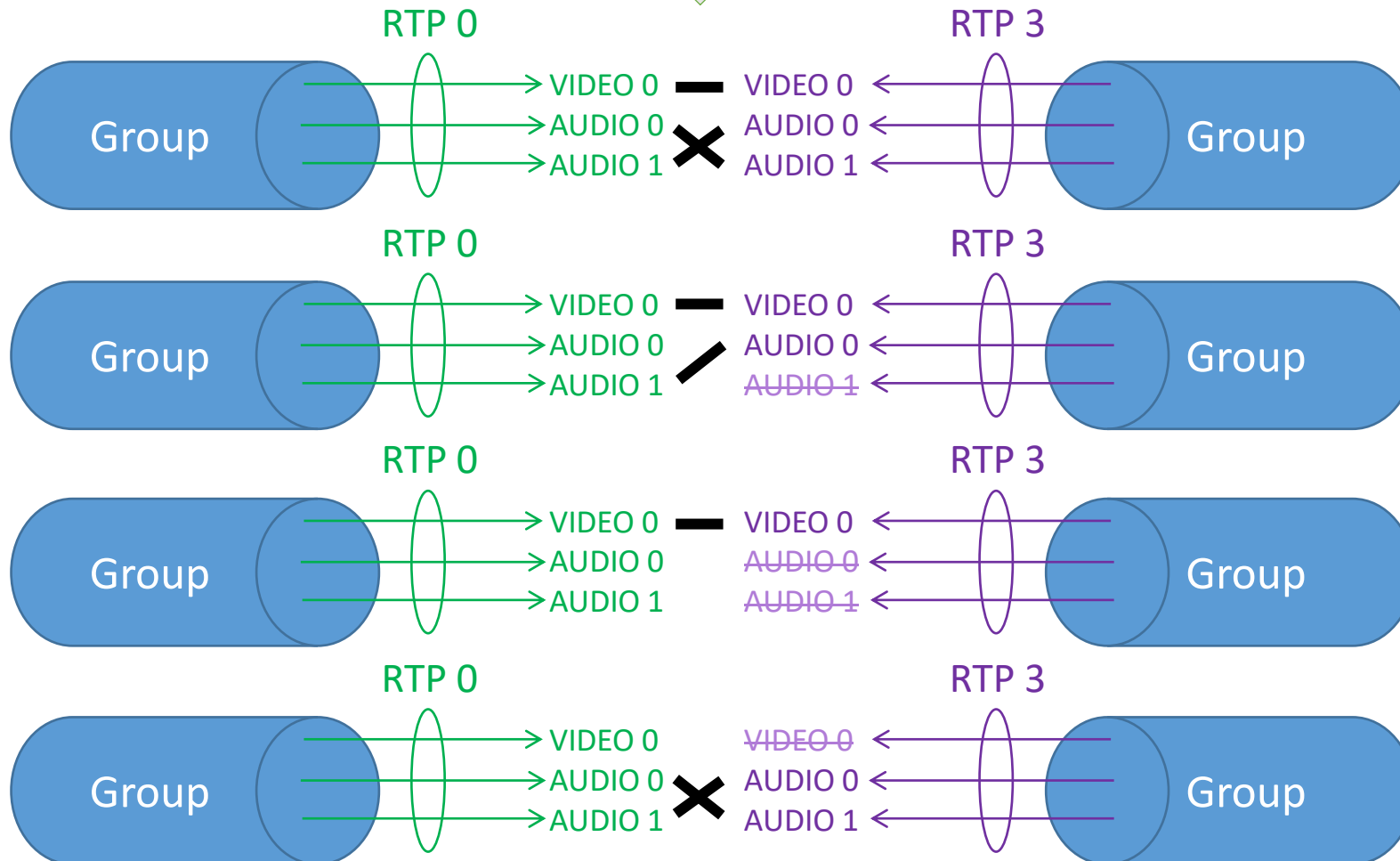
Select a group on the Receiver.  
Select a group on the Sender.  
Connect same:  
role-in-group and role-index'

Remapping on the Receiver side



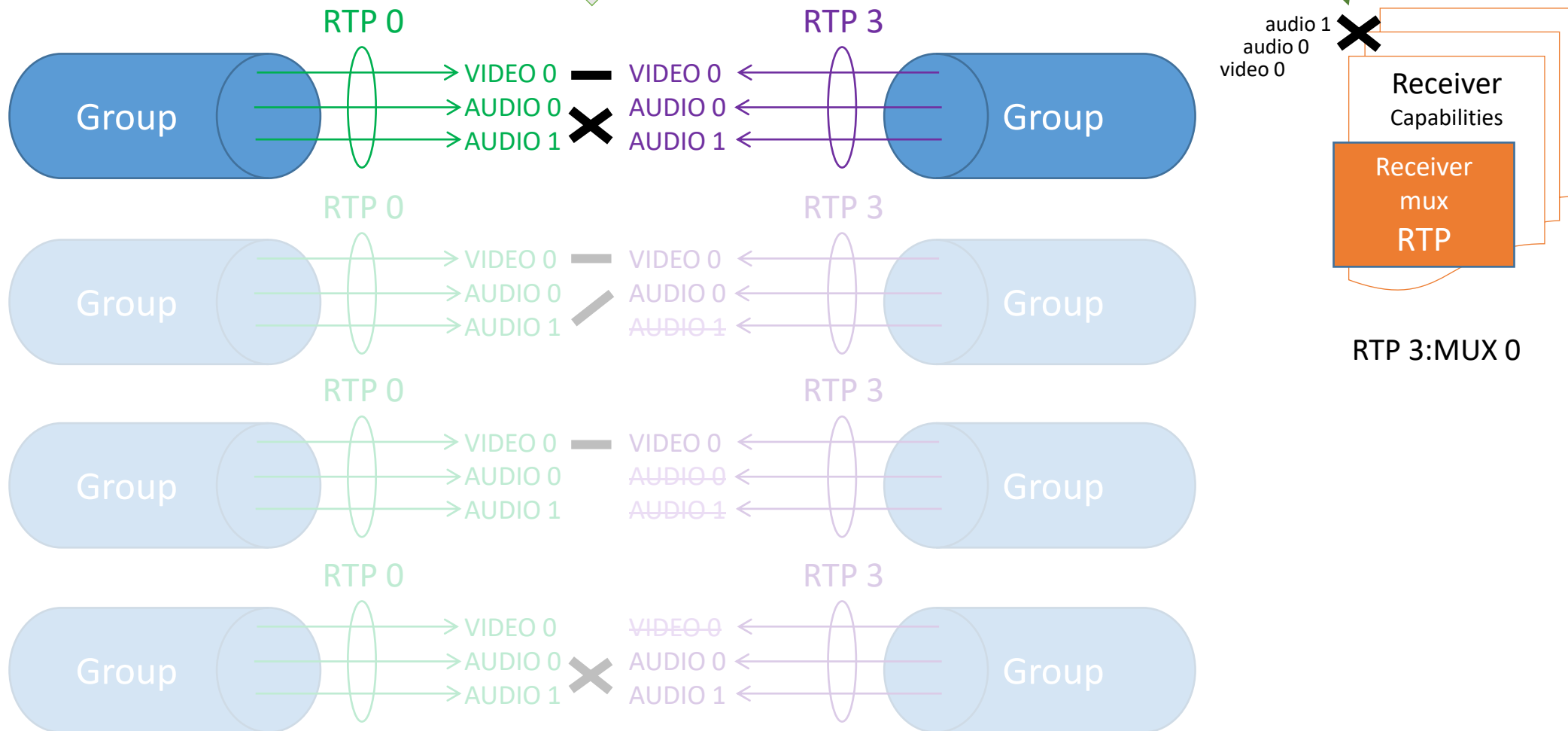
index	index'
0	1
1	0

Controller remapping of independent Receivers  
or  
MPEG2-TS Receiver remapping of sub-streams



Controller remapping of independent Receivers  
or  
MPEG2-TS Receiver remapping of sub-streams

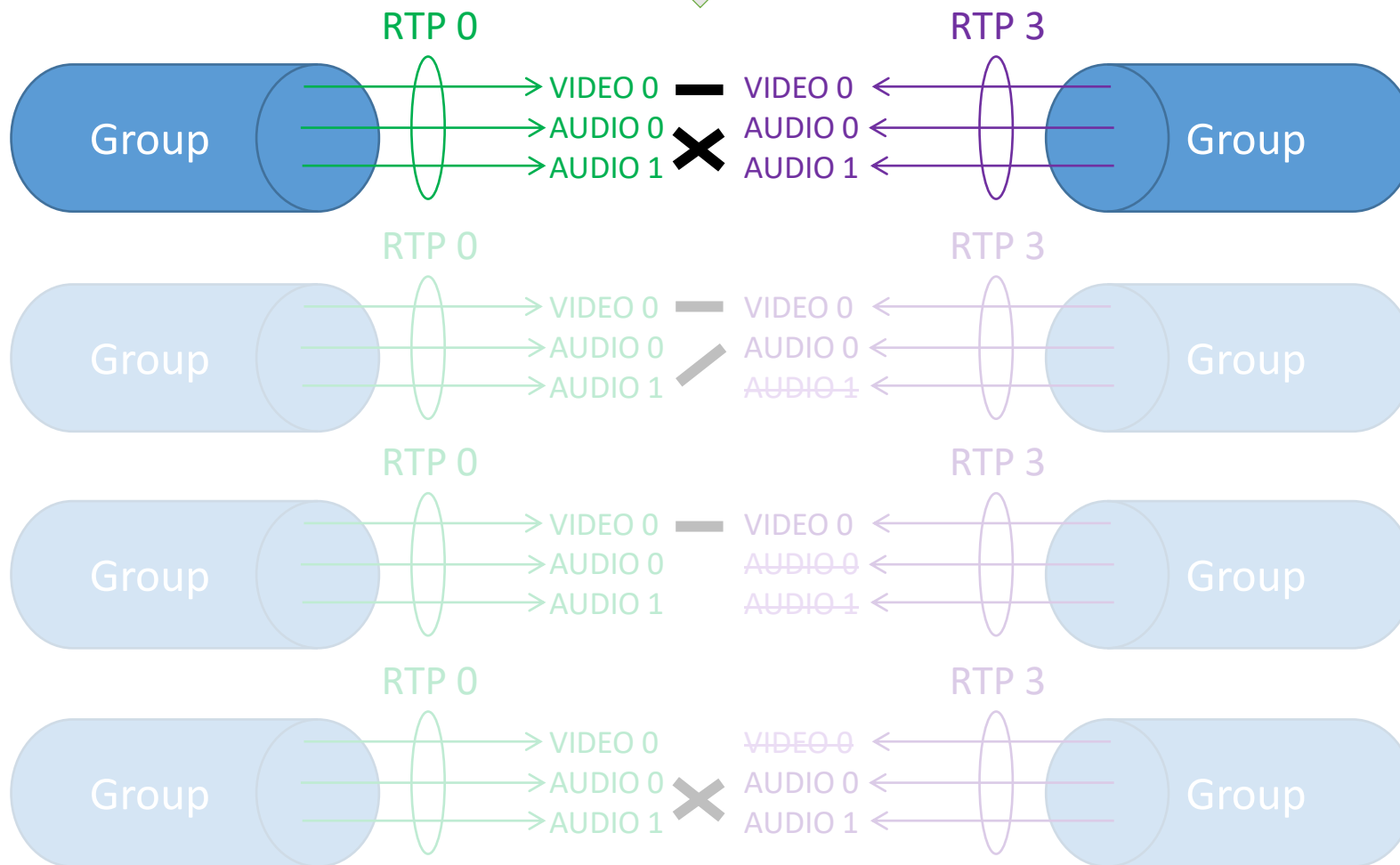
Remapping of  
Receiver  
Capabilities





Controller remapping of independent Receivers  
or  
MPEG2-TS Receiver remapping of sub-streams

Remapping of  
Receiver  
Capabilities



Receiver  
Capabilities

Receiver  
video  
RTP

RTP 3:VIDEO 0

Receiver  
Capabilities

Receiver  
audio  
RTP

RTP 3:AUDIO 0

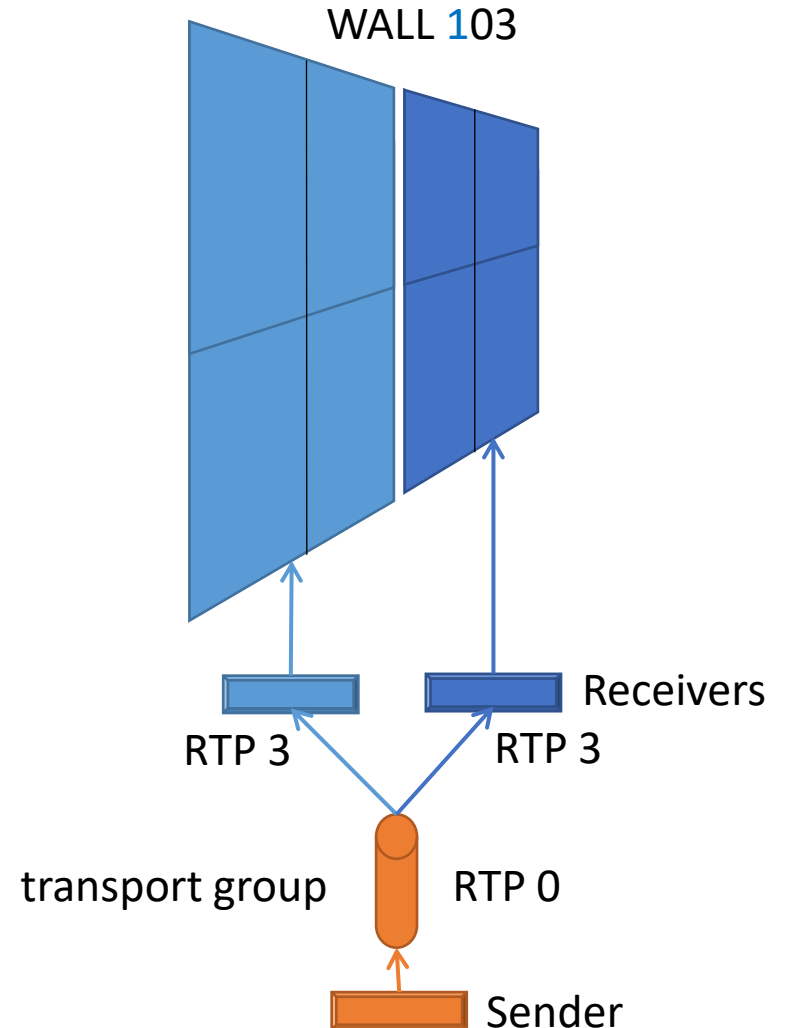
Receiver  
Capabilities

Receiver  
audio  
RTP

RTP 3:AUDIO 1

# More grouping

- grouphint => grouping streams
  - streams within a given device
    - of identical transport
- wallhint => grouping groups
  - groups across multiple devices
    - of identical <group-name> < group-index>



# wallhint

- "tags": {  
    **"urn:x-nmos:tag:wallhint/v1.0":**  
        [ "WALL <wall-index>" ]  
    }  
        ↑  
        └─  $\text{index} * \text{power-of-ten} + \text{<group-index>}$

actual wall index = wall-index / power-of-ten

- This concludes our overview of Natural Groups, a key feature of Matrox NMOS Advanced Streaming Architecture enabling a unified model for managing Streams and sub-Streams in NMOS.
- If you have any questions, feel free to reach out at [abouchar@matrox.com](mailto:abouchar@matrox.com).
- Thank you for attending.

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