ICAO APAC SWIM TF SIPG Working Session 1

Recommendations

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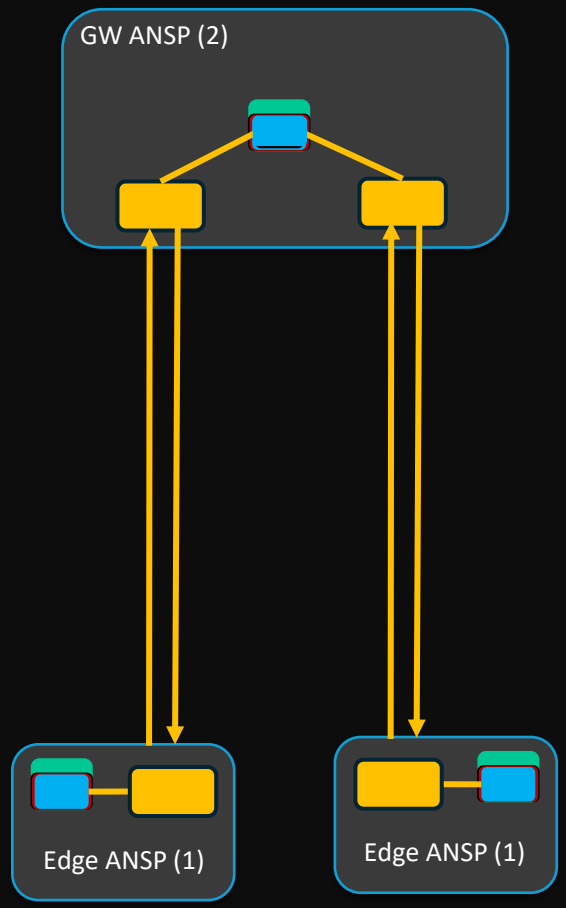
Architecture/Design Recommendations

1. Do not share the ANSP EMS with the GW EMS
2. The ANSP (Edge EMS) is a client to the GW EMS Back-Bone (BB)
3. Limit the number of GW EMSes
4. Use a single EMS product for a GW EMS with one connection type
5. Use topics for regional message routing, message headers for context
6. Support message priority
7. Create a common set of queues on GW EMSes for each Edge ANSP

CANSO

APAC SWIM Connectivity – Gateway and Edges



EMS Interface custom code

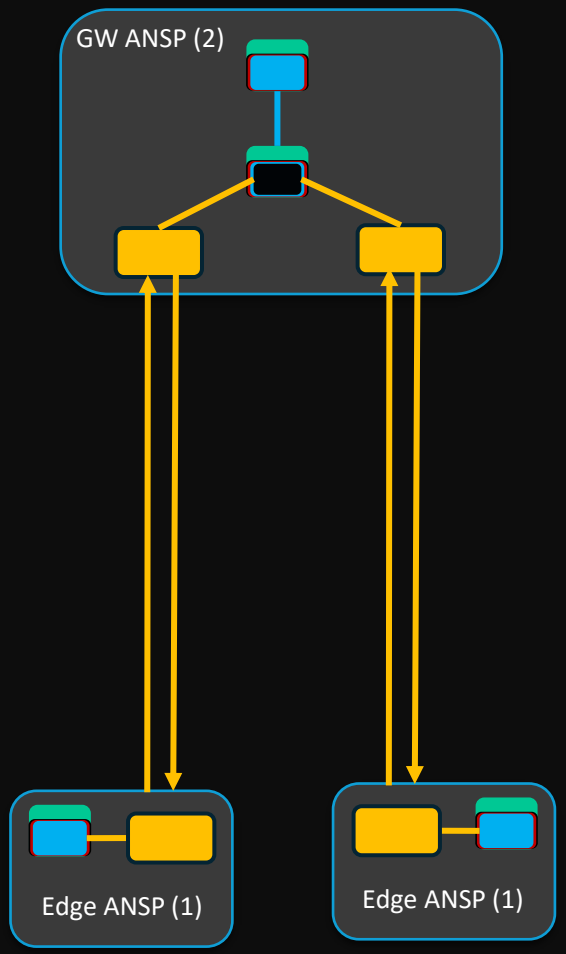
1. Extract a message from an external EMS addressed to its EMS
2. If a recipient list is present, it sends a copy of this message to each recipient
3. If no recipient list is present, it sends a copy of this message to all recipients (each connected Edge EMS and GW EMS)

This is intended to support all MEPs such as publish-subscribe and request-reply.

Interface

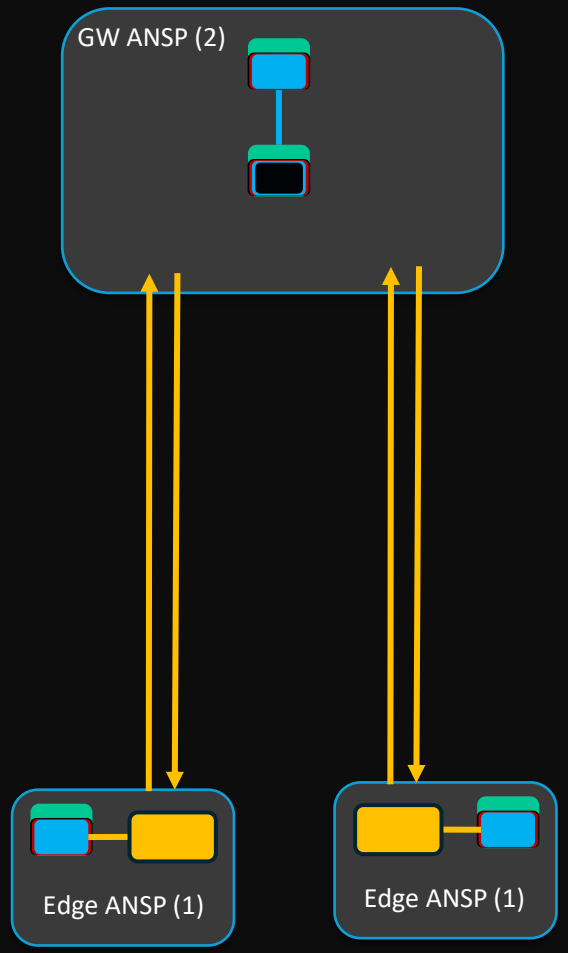
ANSP EMS

APAC SWIM Connectivity – Recommendation #1
Separate GW EMS from ANSP EMS



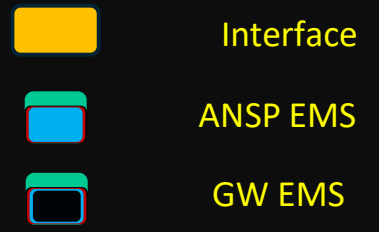
This
1. Reduces the complexity of the GW EMS and ANSP EMS
2. Decouples the GW EMS and ANSP EMS so that their management can be done independently, reducing release frequency

APAC SWIM Connectivity – Recommendation #2
ANSP EMS is a client of the GW EMS, no GW EMS code



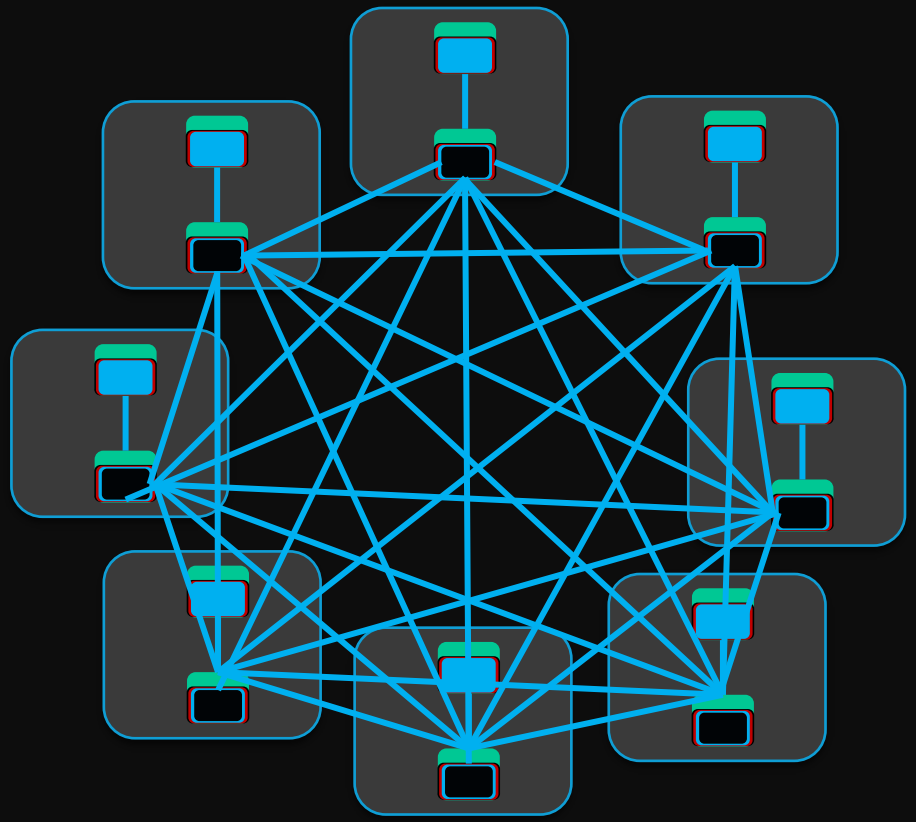
This

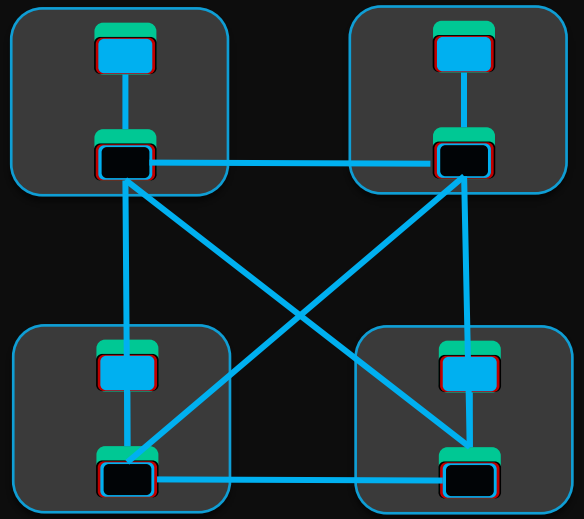
1. Reduces the complexity of the GW EMS
2. Decouples the GW EMS and ANSP EMS further so that their management can be done independently, reducing release frequency
3. Provides much higher GW EMS (and BB) resiliency



APAC SWIM Connectivity – Recommendation #3
Limit the number of GW EMSes

This
1. Reflects the network-centric nature of SWIM
2. Reduces the complexity of the APAC SWIM BB
3. Provides sufficient performance for the region



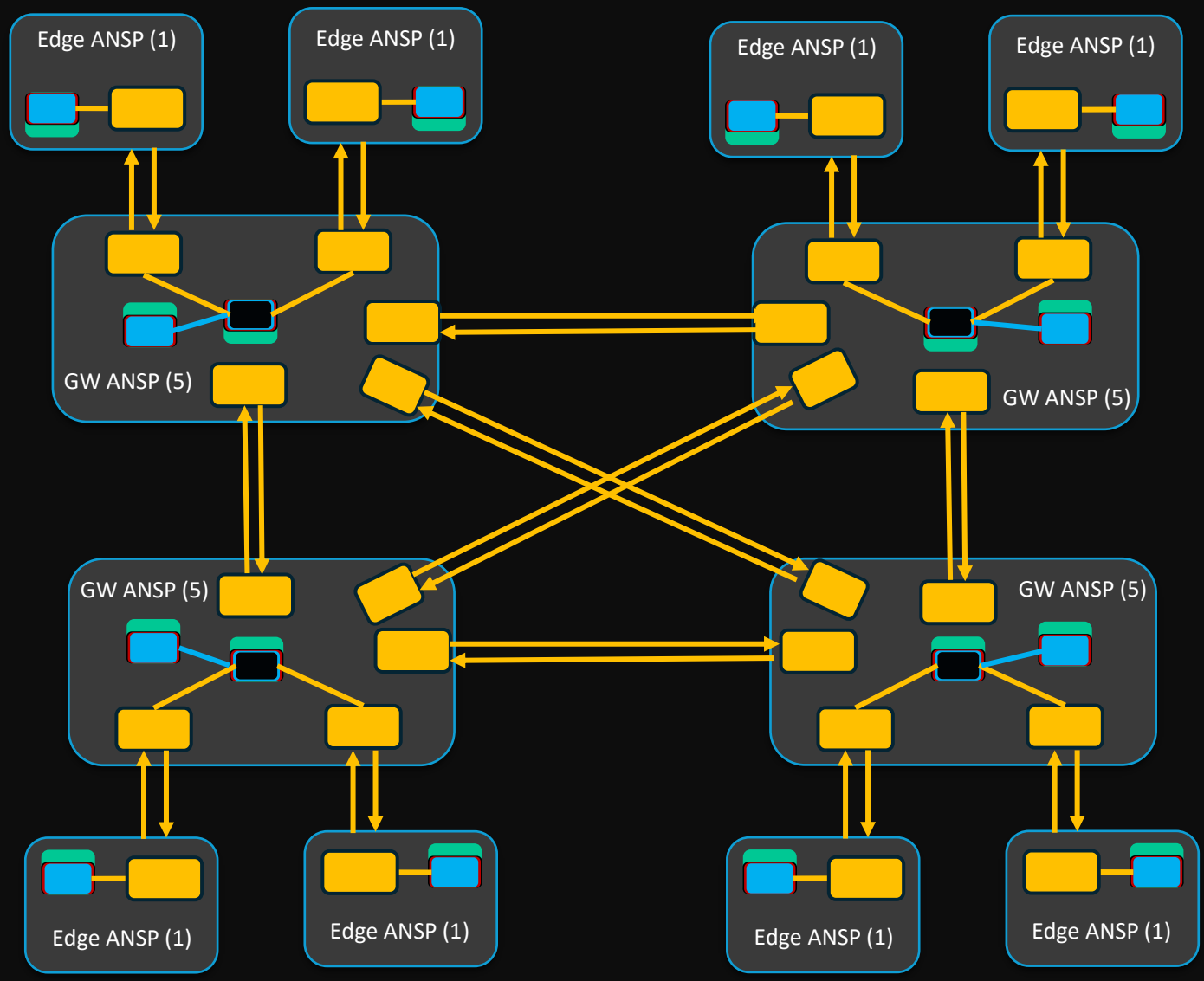


ANSP EMS

GW EMS

CANSO

APAC SWIM Connectivity – Gateway and Edges (without Recommendation #2)



ANSP EMS

Edge ANSP (#)

#=Number of Interfaces

Interface

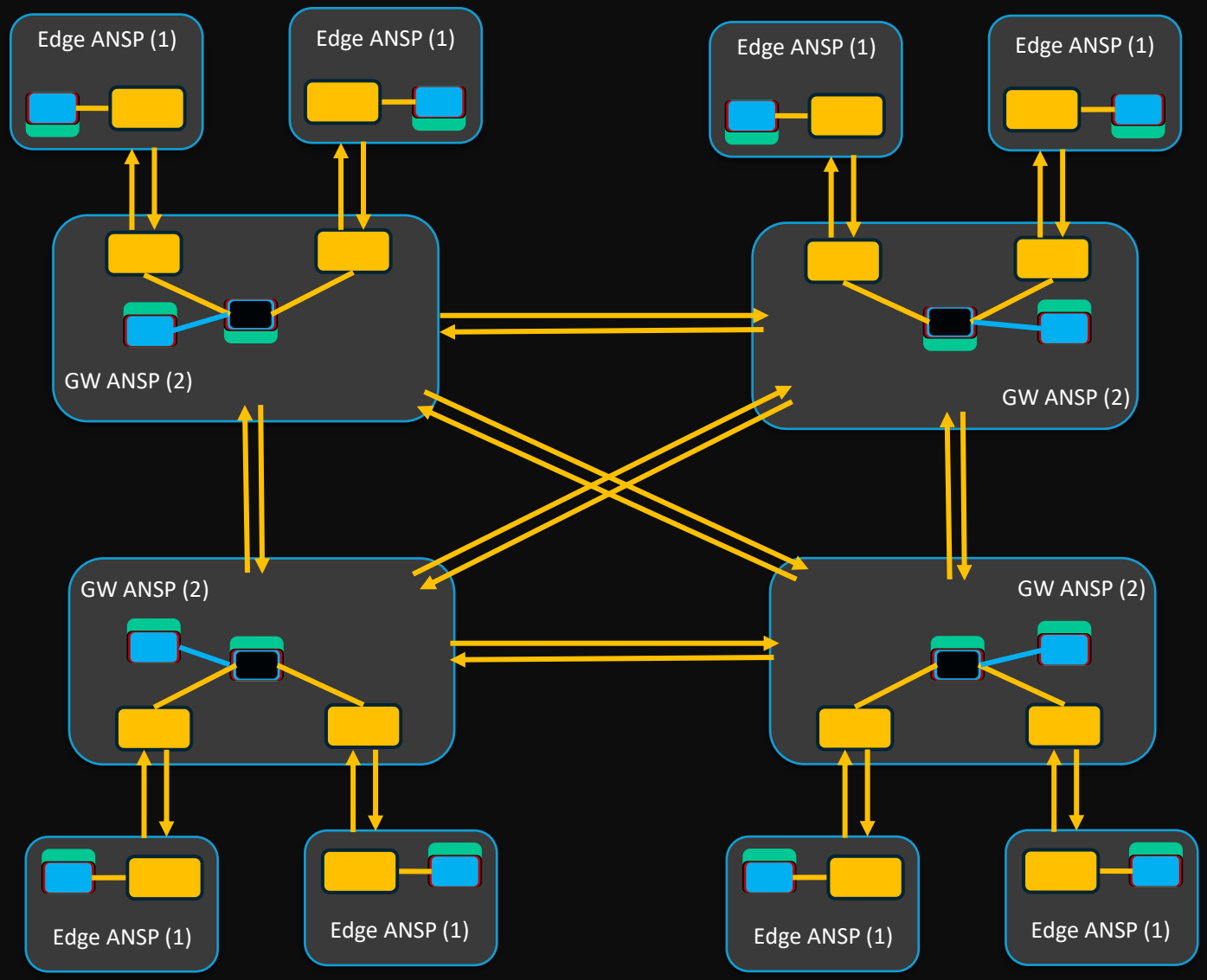
Each interface requires custom code

GW EMS

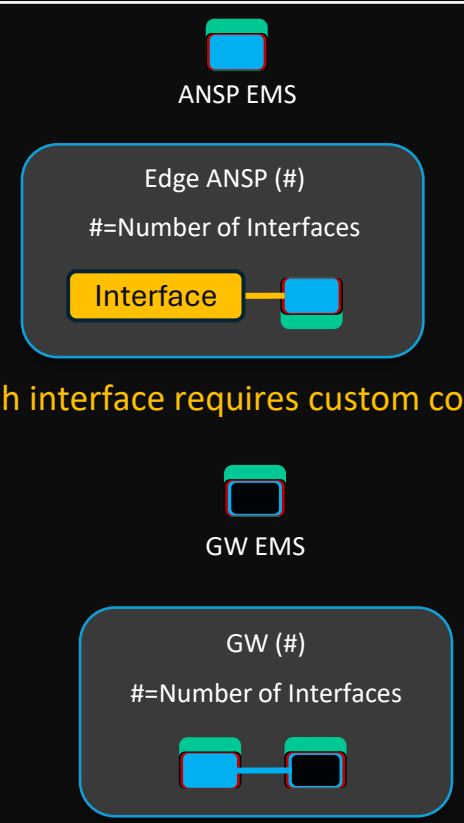
GW (#)

#=Number of Interfaces

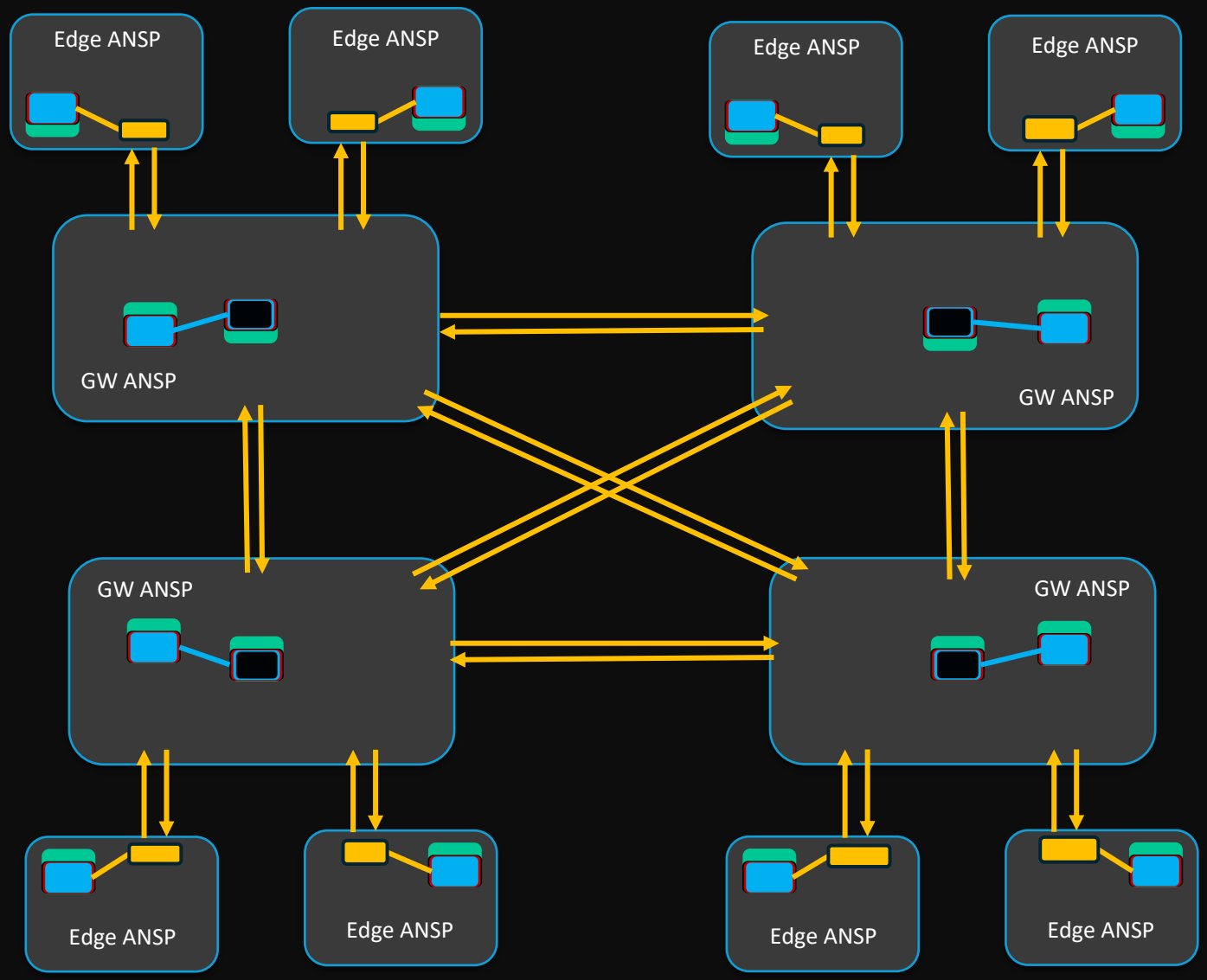
APAC SWIM Connectivity – Recommendation #4
Use same EMS product for each GW EMS, creating a APAC SWIM BB with one connection type



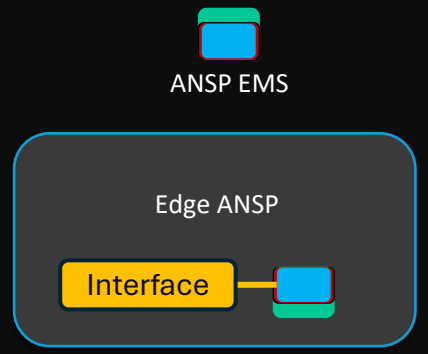
- Topics used for GW-GW transfer with built-in & hardened interfaces, so
  - No interface custom code for is needed for GW-GW transfer
  - Resiliency and availability are improved for GW-GW transfer
- Some EMS products do not require every GW to be connected to every other GW, reducing the number of GW-GW connections
- Adding a GW does not increase the amount of custom code
- Custom code for GW message reception for distributing messages to a recipient list is still required.



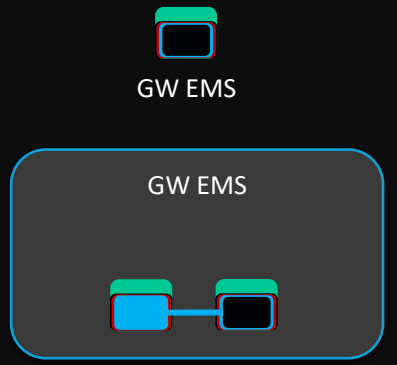
APAC SWIM Connectivity – Recommendation #4 and #2



- Topics used for all routing
  - Reduces the interface custom code needed to only recipient list routing
  - Resiliency and availability are improved for routing
- Custom code for GW message reception for distributing messages to a recipient list is still required, though done through topics.



Each interface requires custom code



Recommendation #5 – Use Topics for Regional Routing, Message Headers for Context

Note: Recommendation #2 – Edge ANSPs are clients of GW EMS (Regional BB)

- **Providing Messages to the Region: Options**
  - Message Header Routing
    - Some EMS products cannot route via message properties. This requires the GW EMS to
      - Write code, host it and provide updates for it – which will vary depending in the GW EMS if recommendation #4 is not followed
      - Increases the attack surface
      - Increases the number of dependencies
      - Decreases resiliency and reduces availability during updates
    - Requires regional routing to have knowledge of the message header and its format
  - Message Topic Routing
    - All EMS products support this
    - No need to write, host or update code
    - Reduces the attack surface
    - Reduces the number of dependencies
    - Increases resiliency and availability since updates are only for the GW EMS itself
    - Metadata element names are not needed, therefore no need to standardise them

Recommendation #5 – Use Topics for Regional Routing, Message Headers for Context

Note: Recommendation #2 – Edge ANSPs are clients of GW EMS (Regional BB)

- **Consuming Messages from the Region: Options**
  - The Edge EMS will consume from queues as a client of the GW EMS
  - The topic and message header are both available for the Edge ANSP

Recommendation #6 – Support Message Priority

- **This is not optional since use cases today require it**
- **All properly engineered systems can support this**
- **The AMHS-SWIM GW provides an AMHS-SWIM priority mapping. This mapping is needed**

Recommendation #7 – Create a common set of queues on GW EMSes

- **Common Queues**
  - Aeronautical – NOTAMs, AIPs
  - Flight Surveillance – Position Reports, ADS-B
  - Flight Flow
  - Weather
  - A-CDM
  - ATFM
  - Administration – Regional notifications
  - Onboarding
  - Voice
  - Video
  - UTM
  - Test

Testing Recommendations

- **#1 - Develop a Regional SWIM Testing Facility**
  - States often have these for State use
  - A regional one is even more important
  - This may use the Internet for communications
  - Ideally support two locations
- **#2 - Develop a Regional SWIM Sandbox for wider testing/demos**
  - This is meant to be always live so any State may perform compatibility tests for example
  - This may use the cloud