**Tenth Meeting of the MID ATS Messaging Management Centre Steering Group (MIDAMC STG/10)
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AFTN/AMHS Asymmetric Routing

By MIDAMC

What is the Asymmetric Routing ?

❑ AFTN/AMHS asymmetric routing is a communication scenario where an inbound message and its outbound acknowledgement or related message take different paths across the AFTN/AMHS network to reach their intended destinations.
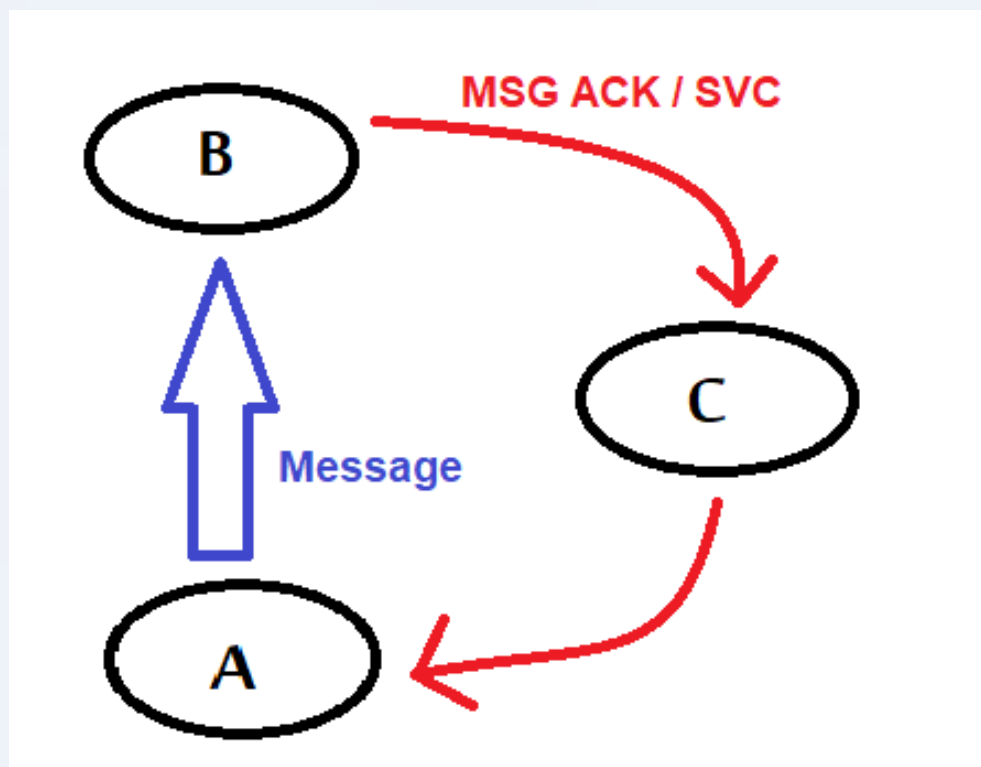
Causes of Asymmetric Routing

❑ **AFTN/AMHS coexistence**

During the migration period, both the AFTN and AMHS systems operate simultaneously. Gateways convert messages between the two protocols, which can introduce asymmetric paths.

❑ **Routing table inconsistencies.**

If routing rules are configured differently for the forward and return paths, messages can be directed along different routes. Consistent AFTN and AMHS routing tables will ensure that messages are routed optimally and symmetrically.

❑ **Dynamic routing.**

COM Centres with redundant paths and dynamic routing protocols may select the "best" path which can lead to asymmetric behavior.

❑ **Network topology changes.**

Events like link failures can cause messages to be rerouted, potentially creating temporary asymmetric paths.

Consequences of Asymmetric Routing

❑ **Missing Acknowledgment**

A significant problem arises when an AFTN/AMHS gateway or message switching center receives a return receipt (RN) for a message without having seen the original message. This can prevent the center from properly generating the corresponding AFTN acknowledgment message.

❑ **Loop Detection Issues**

Asymmetric routing can lead to the detection of routing loops.

❑ **Delayed messages**

Messages following sub-optimal or indirect routes can experience delays, which is critical for time-sensitive air traffic control (ATC) messages.

❑ **Troubleshooting difficulty**

When message flows are asymmetric, it becomes much more complex to trace the path a message has taken and diagnose delivery issues. This can delay investigations into communication failures.

The Good

Area	Outgoing channel
OE	Jordan (AFTN)

UNKNOWN ADS
OSDIYFYY

Convert SVC ADS …
UNKNOWN into NDR

Area	Outgoing channel
OS	Jordan (AMHS)

DD OSDIYFYY

AMHS Link
AFTN Link

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The ugly

The worst

❑ Optimal Route means to create route with minimum number of hops, robust in the case of failures / overload, symmetry of routes, good distribution of traffic, and simple relationships with other Regions.

❑ AMC has an automated tool which can detects:

- Asymmetric Routes

- Potential Loop

- Incomplete path

❑ The MID AMC team should recommend action to the CCC operator to rectify these inconsistencies hop

How AFTN/AMHS handles asymmetric routing

❑ Due to its nature, asymmetric routing cannot be completely avoided during network transitions and normal operations in complex networks. Operators and systems mitigate its effects through

❑ The International Civil Aviation Organization (ICAO) and bodies like Eurocontrol have established guidelines and management centers to standardize and minimize the risks of asymmetric routing. This includes:

❑ **Centralized routing management:**

The establishment of a body like the Air Traffic Services Messaging Management Centre (AMC) helps coordinate routing tables across regions.

❑ **Consistent routing tables:**

Close coordination of AMHS and AFTN routing tables among all Communication Centres is essential to ensure symmetrical routing.

❑ **Robust validation:**

Automated tools for detecting asymmetric routes, incomplete paths, and potential message loops.

❑ **Clear addressing procedures**

Procedures for handling addressing changes .