

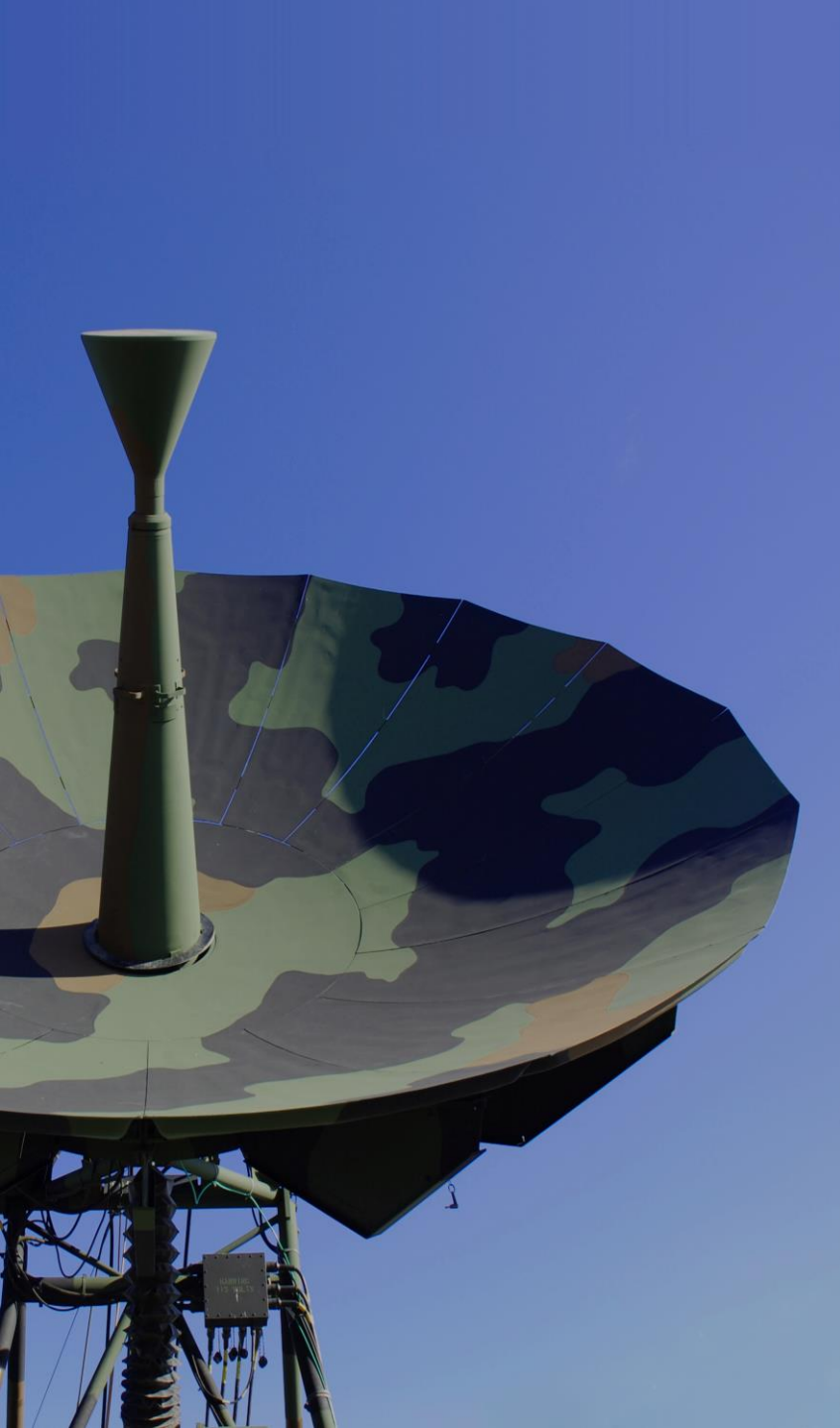
Isode

STANAG 5066 ROUTING SUBLAYER

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Contents

- The Problem to be solved for WTRP
- Routing Sublayer and Alternate Approaches
- Other Problems Routing Sublayer Solves
- Protocol Overview

Problem: Data Routing for WTRP

- Wireless Token Ring Protocol (WTRP) supports topologies with partial connectivity on shared HF channel
- Highly desirable in target Naval Task Group environment with communication by HF Surface Wave
 - Supports ships that cannot communicate directly (because they are too far apart) but can relay via other ships
- WTRP manages the topology but does not route data

Solution: Add Routing Layer to STANAG 5066

- Routing Sublayer specified in “STANAG 5066 Routing Sublayer” (S5066-EP13)
- Optional Sublayer
 - Use needs to be agreed “deployment wide”
 - Makes sense to use whenever WTRP is used
- Alternate Approaches (and why not suitable) considered in next two slides
 - Application Level Routing
 - IP Routing

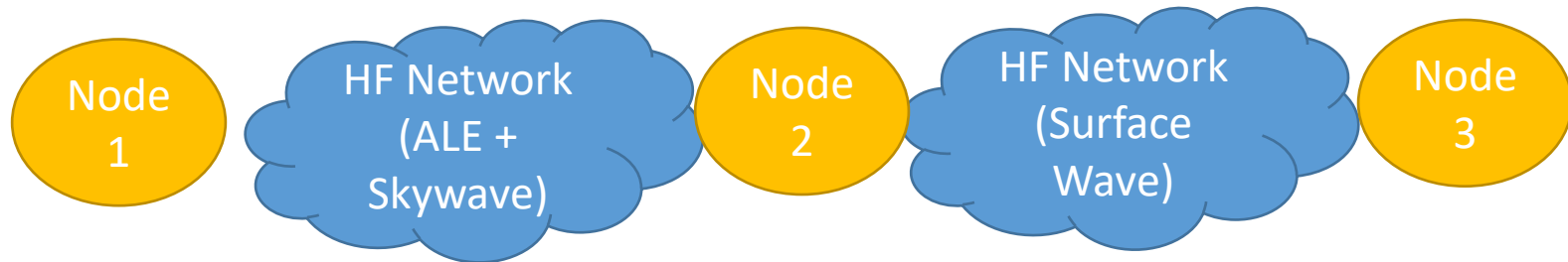
Application Level Routing

- Where it can be used, application routing is highly desirable for use with HF
 - When sending data over HF, best to have the application close to the HF
 - If multiple HF hops, application relay provides good isolation
- Some (key) applications naturally use application level routing
 - Messaging using Message Transfer Agent (MTA) relay
 - XMPP using XMPP Trunking
- Some applications do not (e.g., Web Browsing)
- Application Level Routing Needs stable configuration
 - Changing application level routing is slow
 - This makes it unsuitable for WTRP

IP Routing

- Dealing with multiple subnets with IP routing is a standard approach
- Problematic to use with WTRP
 - No mechanism for IP routing to work out changes of topology
 - Hard to provide a WTRP mechanism to communicate topology changes
- And even if it was straightforward
 - Performance of Applications over IP over single HF hop is generally dire
 - See Isode white paper “Measuring and Analysing STANAG 5066 F.12 IP Client”
 - Trying to operate with multiple “IP over HF” hops would be insane....

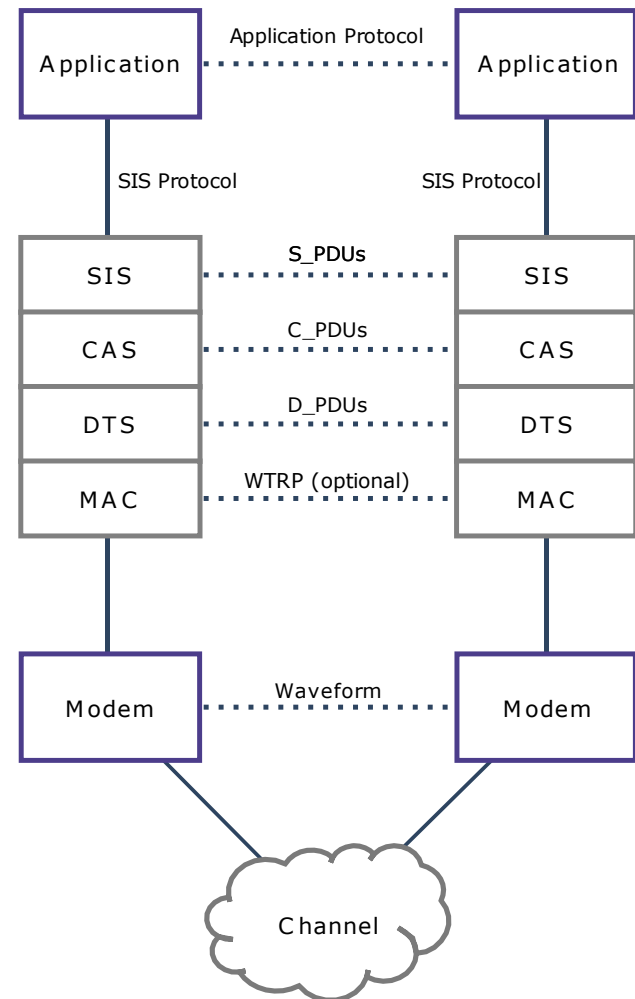
Routing over Multiple Independent Networks



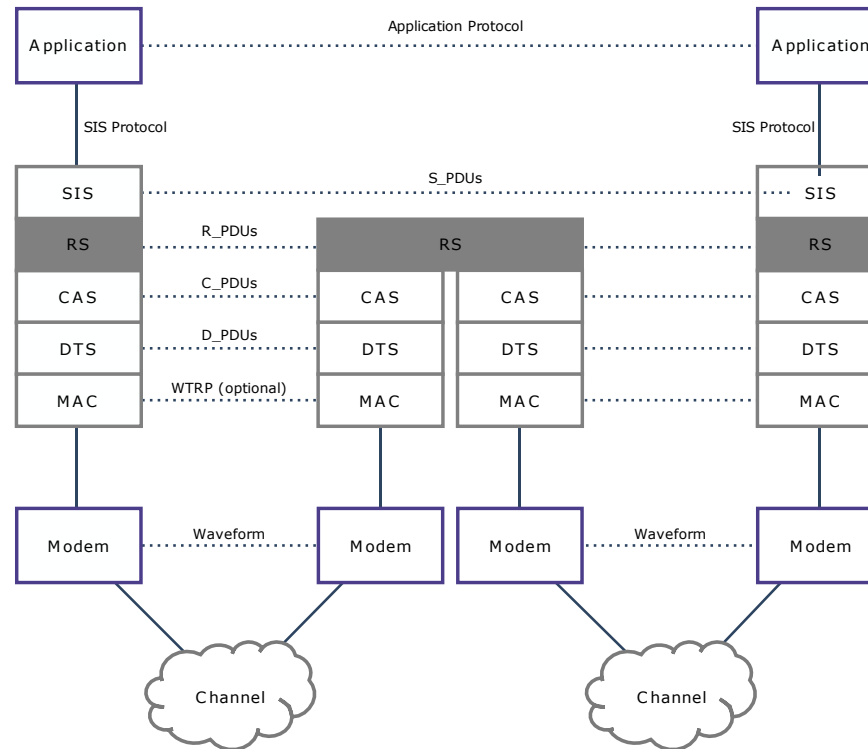
- Routing Sublayer also enables systems with multiple HF networks
- Consider a scenario shown above
 - Assume configuration is too dynamic to use application routing
- Routing Sublayer can enable STANAG 5066 traffic between Nodes 1 and 3
- Can also enable clients on Node 2 to use STANAG 5066 addressing and have traffic switched to the correct network
- Could also be used to mix other network technologies (e.g., UHF)

Reminder of STANAG 5066 Stack

- Shown without Crypto
- MAC layer has protocol if WTRP is used, but not for CSMA



Multiple Independent Networks

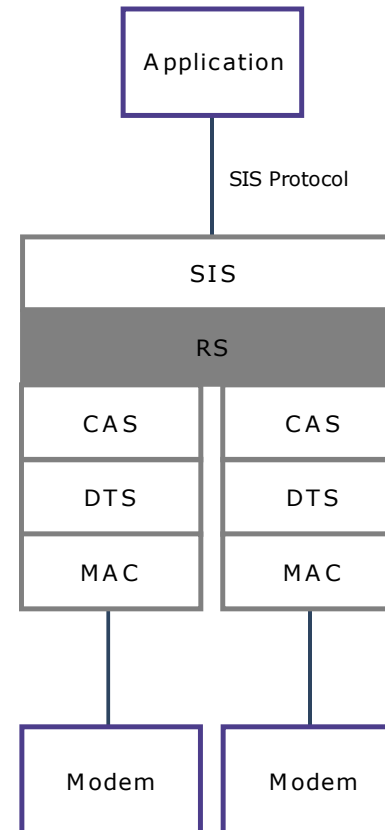


- Simpler to understand than WTRP
- SIS Protocol is end to end
- Routing Sublayer (RS) between SIS and CAS

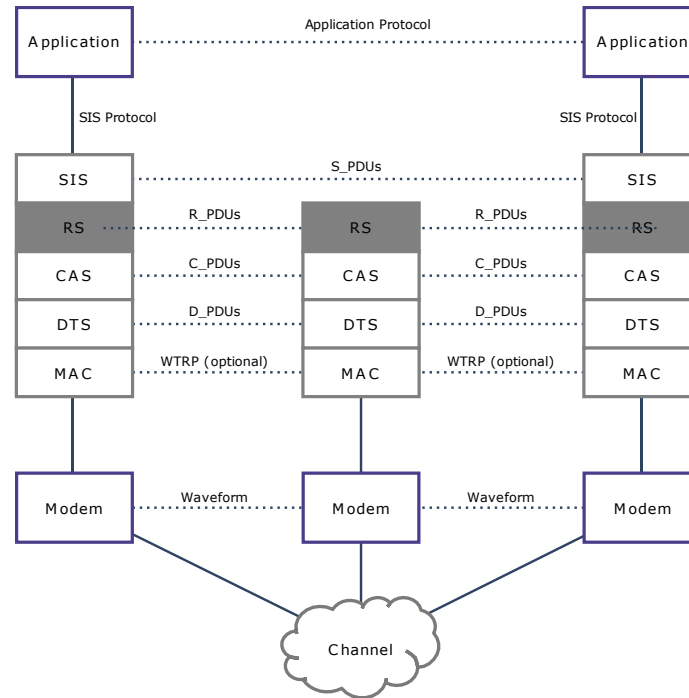
- Layers below RS are single hop
- SIS PDUs are simply switched by the middle system
- Routing information exchanged between nodes

Client Access to Multiple Stack

- Routing Sublayer allows client to send STANAG 5066 addressed information to SIS layer.
- RS can validate address and pass to correct network



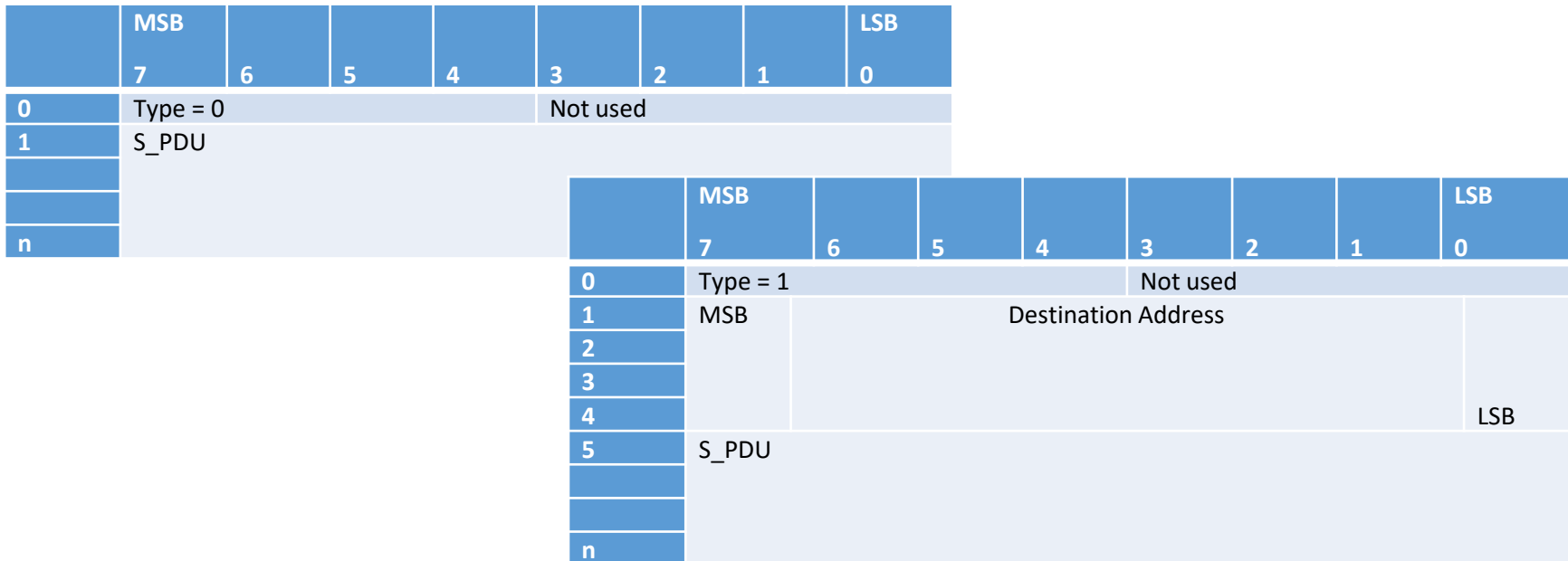
Routing Sublayer and WTRP



- In middle (switching node) messages arrive and leave on the same stack
 - Middle node can hear both end nodes
 - End Nodes cannot hear each other

- “HF Wireless Token Ring Protocol” (S5066-EP12) passes information up the stack to enable correct routing

Routing Sublayer Protocol



- Routing Sublayer has very simple protocol
- Direct PDU has one byte header (type=0)
- Indirect PDU (type=0) carries final destination
 - Allows PDU to be routed over multiple hops
- Two more PDUs to support multicast/broadcast
- Fifth PDU to communicate routing information
 - For multiple networks
 - Not needed for WTRP

Conclusions

- Optional Routing Sublayer is needed to support partial networks with Wireless Token Ring Protocol
- Optional Sublayer only needed for use with WTRP
 - Use of Routing Sublayer would need to be agreed “deployment wide”
- Safe and simple extension
- Recommended for STANAG 5066 Ed4

Any Questions?