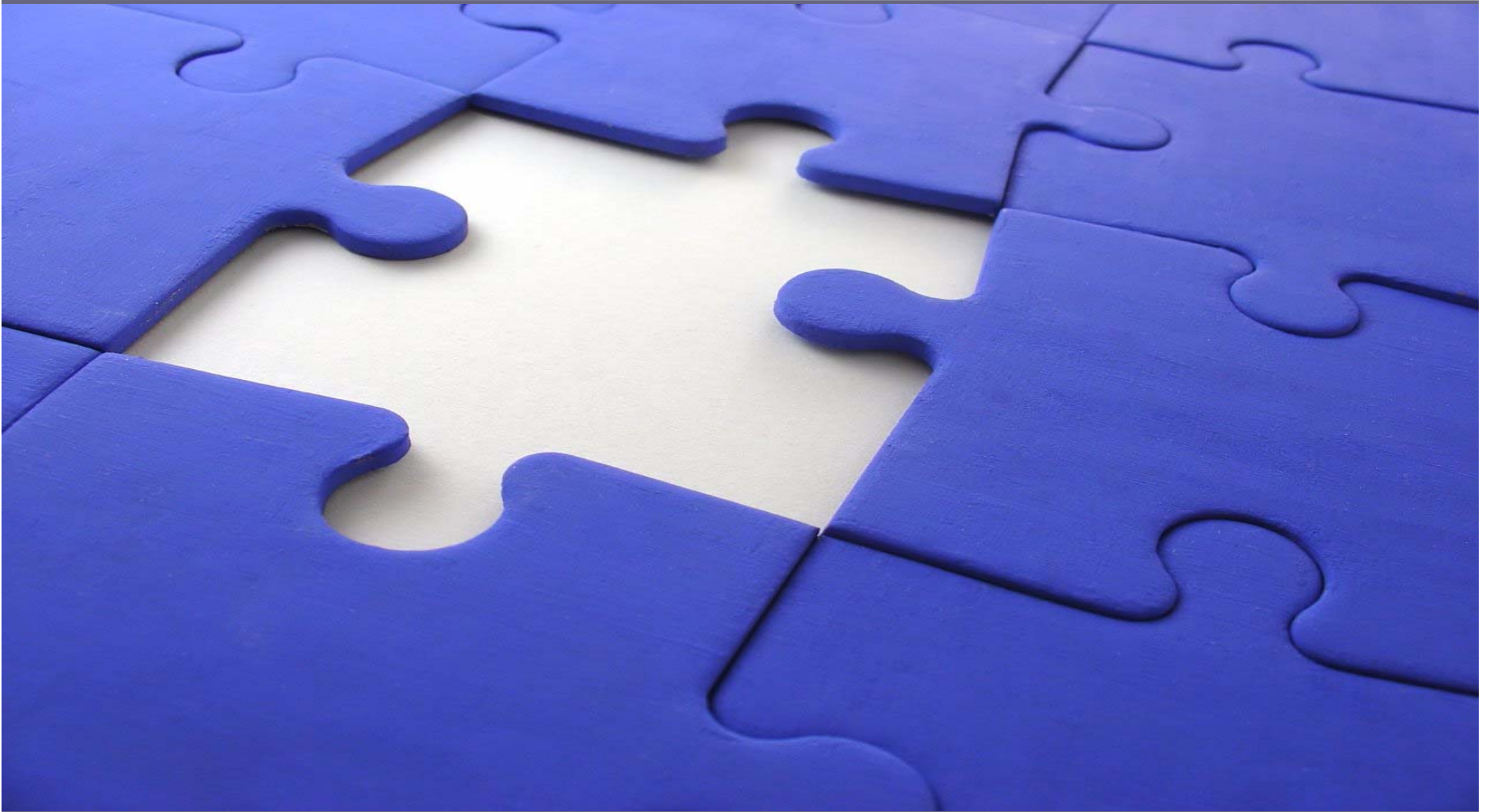


Running Applications over HF without IP



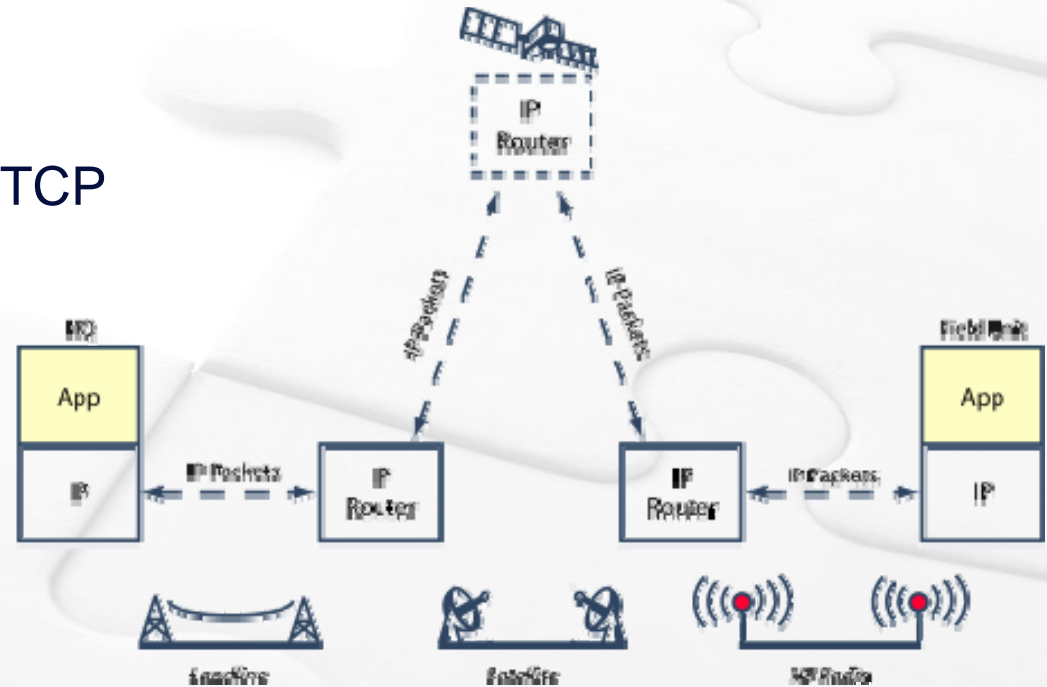
Applications over HF

- It seems desirable to support as many applications as possible over HF for deployed units
- Possible target applications
 - MMHS (STANAG 4406)
 - Internet Email
 - Directory (replication)
 - IM/Presence (XMPP)
 - Situational awareness
 - Web (with care)



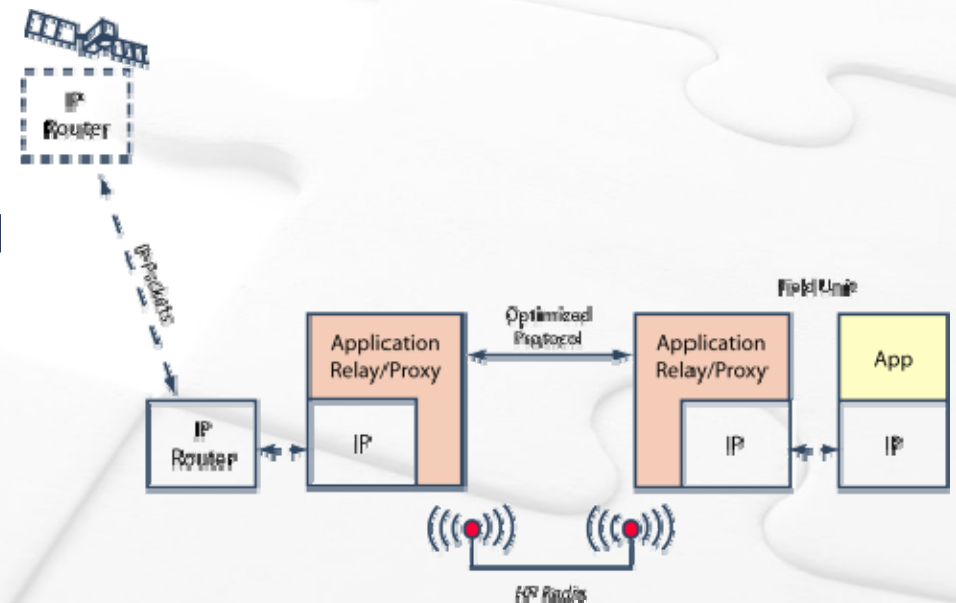
The problem with "pure IP"

- IP Assumed in many Network Centric Warfare plans
- Poor utilization of HF link
 - Hard to fill pipe efficiently
- Chatty applications such as TCP
 - Inefficient and high latency
- Control in the wrong place
 - Don't send large message..

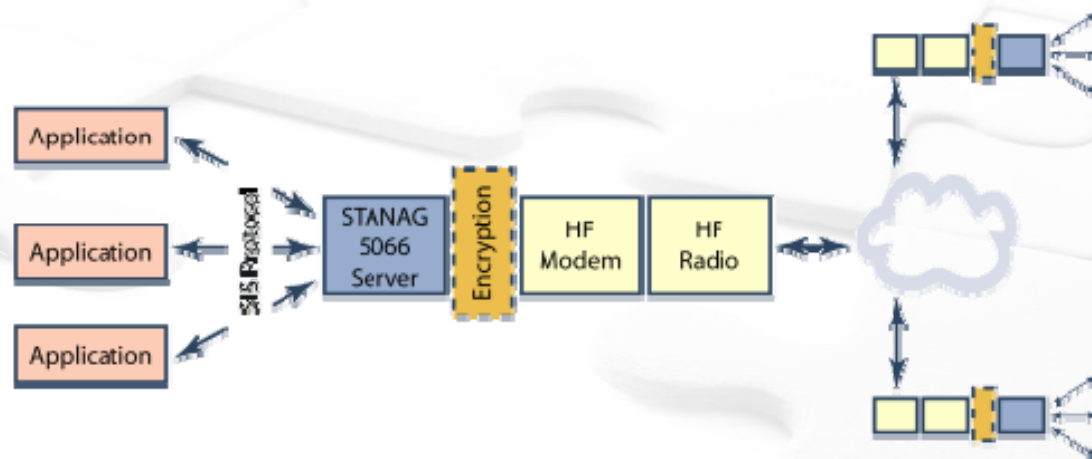


IP with Application Relay

- A variant that will work
- Optimizes use of the HF link
- Control is in the right place
- Enables Broadcast & EMCON
- Transparent to end user



STANAG 5066



- Excellent approach for HF Applications
- Allows applications to share link
- Clean separation of applications (SIS Protocol)
- Efficient use of HF link



Standards for Messaging over HF

	Internet Messaging	STANAG 4406
Point to Point	HMTTP CFTP	STANAG 4406 Annex E & ACP 142 (sub-optimal)
Multipoint (including EMCON)	No Standard	STANAG 4406 Annex E & ACP 142



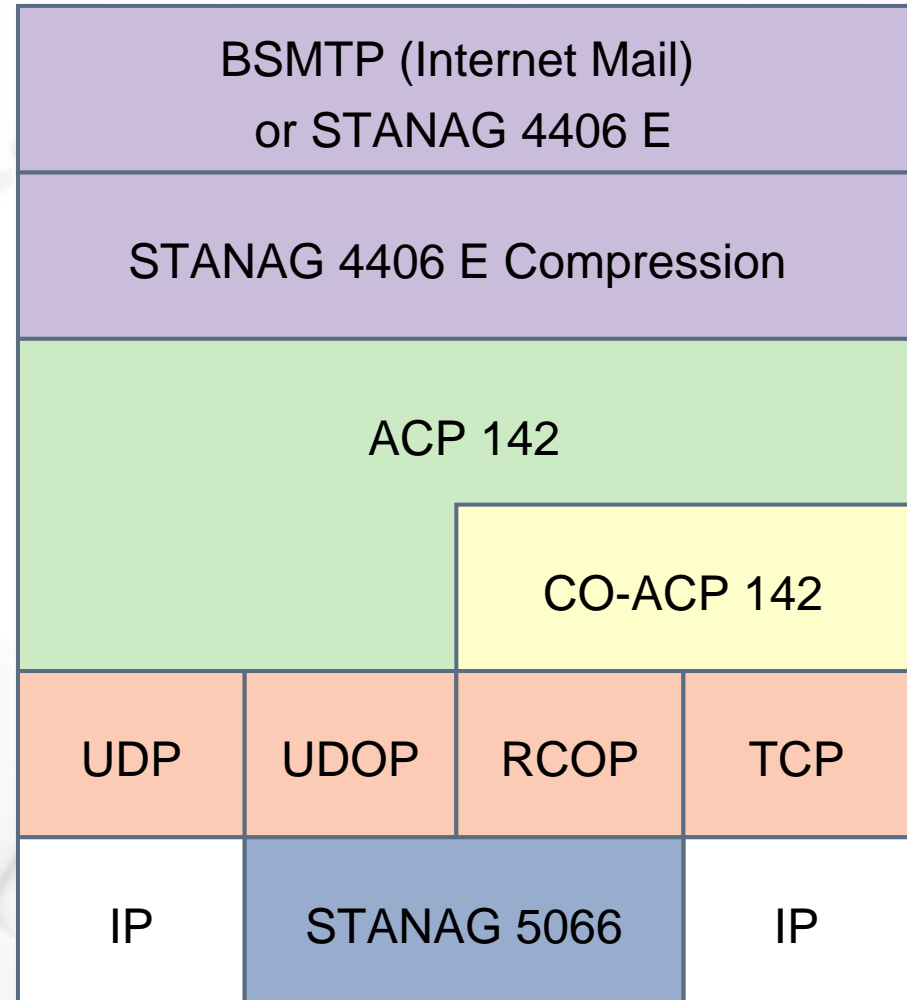
Why an Optimized Point to Point Protocol?

- (As opposed to using a multipoint setup with two nodes)
- Better 3G ALE options
 - Can often negotiate a better/faster link point to point
- Data rate can adapt to varying conditions (S'5066)
- More efficient data retransmission options
 - S'5066 ARQ or S'4538 ARQ
 - Application does not need to handle retransmission
 - Can use large APDUs without a performance trade-off



Isode's Messaging Protocol Architecture

- Provides a solution for all four combinations
- Batch SMTP Format (BSMTP) allows transfer of Internet Mail
 - Isode defined format based on RFC 2442
- Mappings onto IP and STANAG 5066



Connection Oriented ACP 142

- ACP 142 protocol variant, optimized for point to point
 - PDUs are based on ACP 142 PDUs
- Placed within ACP 142, as application cannot generally make ACP 142 vs CO-ACP 142 decision (e.g., EMCON)
- Segments message onto one or more 64 kbyte (max) RCOP transfers
- Includes transfer acknowledgement



Isode's M-Switch Product Support (Sep 2008)

- M-Switch supports: X.400; SMTP; MIXER (conversion)
- ACP 142 channel supports both Internet and X.400 formats
- Enables integrated deployment of both types of messaging



The New Message Protocol Matrix

	Internet Messaging	STANAG 4406
Point to Point	HMTTP CFTP BSMTP & CO-ACP 142	STANAG 4406 Annex E & CO-ACP 142
Multipoint (including EMCON)	BSMTP & ACP 142	STANAG 4406 Annex E & ACP 142



Benefits of BSMTP + CO-ACP 142

- A new protocol was introduced for point to point internet messaging
- Comparison to CFTP
 - HMTP is a poorer protocol than CFTP
- Operation over IP (useful for Satellite)
- Clean Co-existence with MMHS (STANAG 4406)
- Clean switch with multi-point



Benefits of BSMTP + CO-ACP 142 (continued)

- Support for DSN (Delivery Status Notification)
 - Can request positive delivery reports
- Supports BINARYMIME & 8BITMIME
- Removes 128 MByte max message size
- Extensible choice of compression algorithm
- Slightly more compact (but uses same default compression)
- Cleaner and more robust transfer architecture



Directory Replication

- ACP 133 Directory shares mission critical information
- Directory access over HF is too slow
 - So, need to replicate
- Standard Directory Replication
 - Not optimized for HF
 - No support for EMCON or Multicast
- Defining a new protocol would be quite complex



Directory Replication by Email

- Generate Incremental Directory Changes
 - LDIF Format
 - Sequentially numbered
- Transfer by email (Internet or STANAG 4406)
- Import changes into consumer directory server
- Flexible and network efficient
- Supported by Isode's Sodium Sync (Sep 2008)



Email as an HF Building Block

- Email (Internet or STANAG 4406) over HF Provides
 - Reliable Transfer
 - Compression
 - Multicast
 - EMCON Support
- Good approach for directory replication
- Likely to be a useful building block for other applications



XMPP – IM & Presence

- XMPP – eXtensible Messaging & Presence Protocol
 - The open standard for Internet Messaging and Presence
- Increasing Military Adoption
 - Wide US Usage (JFCom/SPAWAR)
 - NATO (JChat)
- M-Link – Isode's XMPP server product
 - Targeted for military and secure government



XMPP as a Building Block

- XMPP is intended as an infrastructure, not an application
 - Chat Rooms
 - File Transfer
 - White-boarding
 - Extended Presence (e.g., Geo-location)
- A useful military component
 - Could be the basis for integrated situational awareness



XMPP over HF

- Seems like a good idea
- Some interesting technical challenges
- Isode plans to provide in Q1 2009
- We are keen to talk to anyone interested in XMPP over HF



Summary

- STANAG 5066 can support a wide range of applications
- Running applications over IP over HF should be avoided
 - Use application relays to integrate with HF environment
- Email and XMPP can be building blocks for other applications



Questions?

- HF Radio and Network Centric Warfare
(<http://www.isode.com/whitepapers/network-centric.html>)
- Why IP over HF Radio should be Avoided
(<http://www.isode.com/whitepapers/ip-over-stanag-5066.html>)
- Replicating and Synchronizing Data between Directory Servers
(<http://www.isode.com/whitepapers/replication-sync.html>)
- Instant Messaging and Presence for Secure Environments
(<http://www.isode.com/whitepapers/secure-im.html>)
- Contact: steve.kille@isode.com

