

Collaboration services: Enabling chat in disadvantaged grids

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Outline

Our paper presents our implementation of ACP142 and a chat application over that protocol. The work was performed in context of NATO/STO IST-118.

Presentation outline

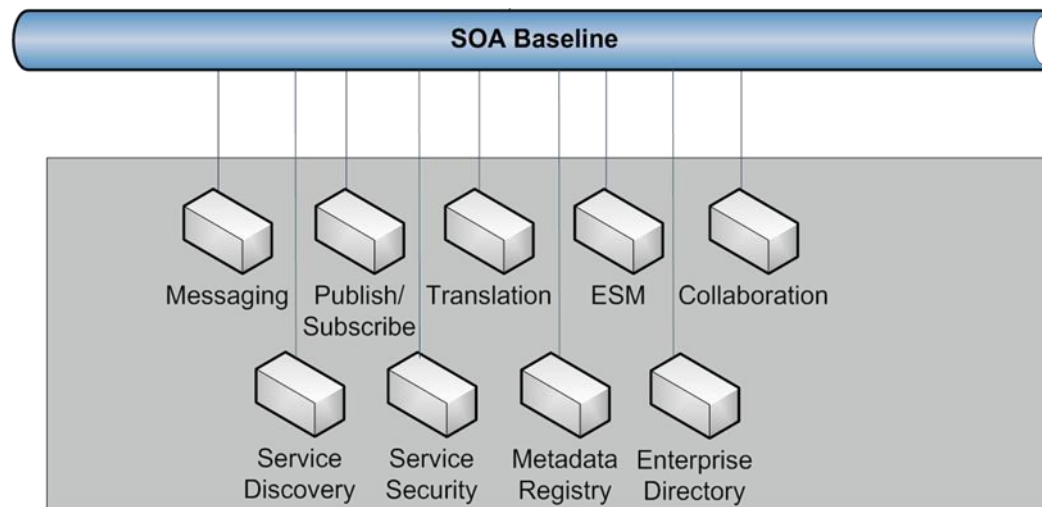
- Intro to IST-118
- Background / observations
- ACP142
- Chat solution
- Conclusion

IST-118 – SOA recommendations for disadvantaged grids in the tactical domain

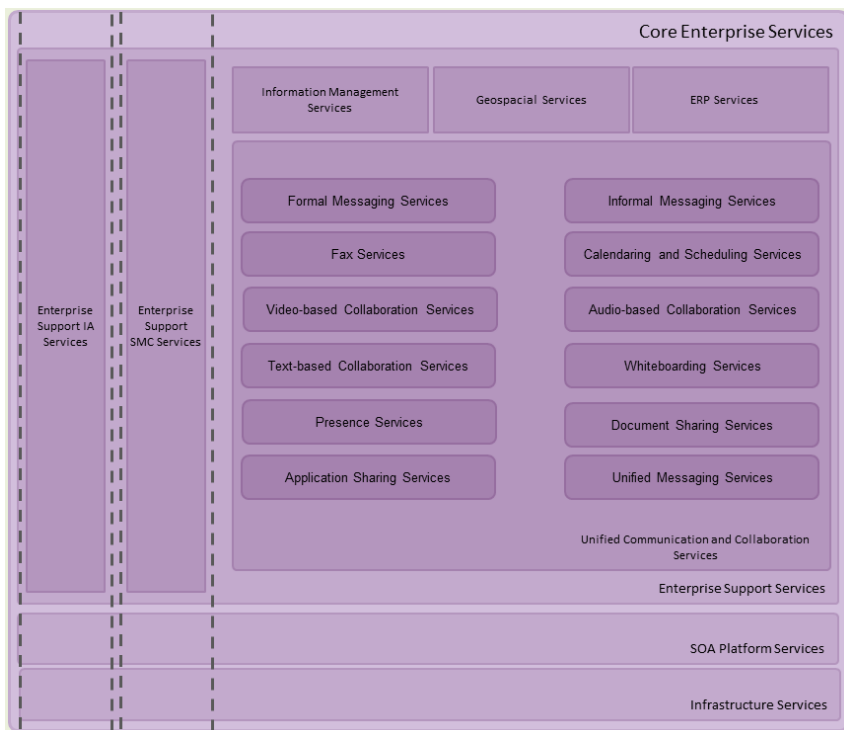
- NATO STO/IST-118 aims to provide recommendations and guidelines when it comes to extending the SOA paradigm into the tactical domain.
- The group currently consists of domain experts from
 - the NATO Communications and Information (NCI) Agency,
 - Germany,
 - the Netherlands,
 - Norway,
 - Poland, and
 - the United Kingdom.
- Interested in contributing/participating?
 - Please contact the group chairman, Peter-Paul Meiler (peter-paul.meiler@tno.nl).

NATO IST-118

- The main focus is on identifying what we call tactical SOA foundation services.
 - which core enterprise services do we need support for in the tactical domain?
- We aim to investigate how services from the SOA baseline can be extended for use in tactical networks → *Tactical SOA profile*



NATO C3 Classification taxonomy



- Taxonomy excerpt showing the «Core Enterprise Services» part of the «Technical Services».
- Expanded view of the «Unified Communication and Collaboration Services».

Background

- Collaboration
 - Text-based collaboration (instant messaging aka “chat”) is an important aspect.
 - Many different solutions, e.g., irc, XMPP, and others
 - SOA baseline specification: collaboration services
 - Identifies the eXtensible Messaging and Presence Protocol (XMPP)
 - XMPP
 - Client/server based.
 - Not well suited for use in disadvantaged grids / DIL environments.
 - Focus of IST-118: Enable core services in disadvantaged grids.

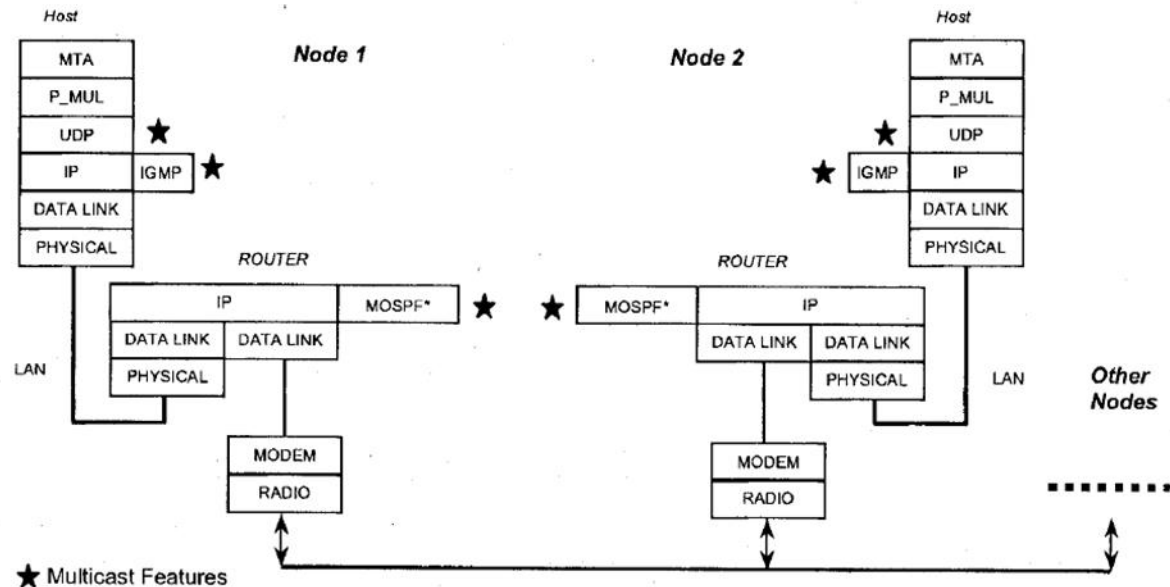
Observations

- Instant messaging can be one-to-one, but is more often one-to-many information dissemination
- Multicast
 - an efficient means of distributing one message to many recipients.
 - decentralized, no central server, thus no single point of failure.
 - Many implementations exist, also of reliable multicast protocols.
- Disadvantaged grids
 - low bandwidth, variable throughput, unreliable connectivity, and energy constraints
 - Also, occasional need for radio silence (EMCON)
- We need
 - A multicast protocol developed for use in tactical radio networks that can cope with mobility and disruptions.

ACP 142 / P_MUL

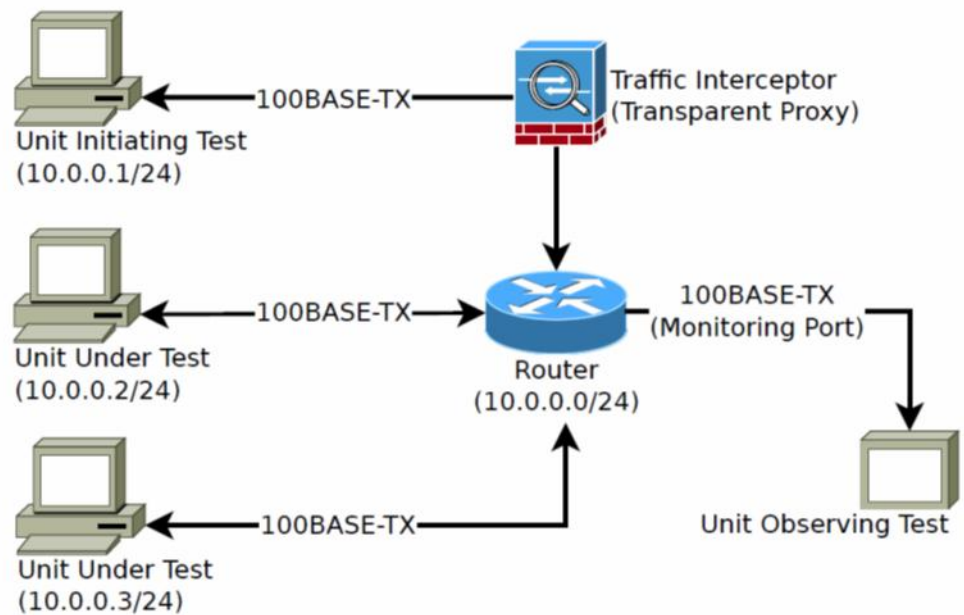
- The ACP142 protocol for reliable multicast has been designed specifically for use in tactical networks.
- Key properties
 - Reliable multicast messaging
 - Designed for bandwidth-constrained networks
 - Delayed acknowledgement for EMCON environments
- Thus, the protocol has all the properties we need in a reliable multicast solution for one-to-many communication in disadvantaged grids.
 - The specification defines the ACP142 for different transport protocols, including IP, which we focus on – “Everything over IP” mindset.

ACP142 implementation on UDP/IP stack



- Contribution: An implementation of ACP142 in Java
 - Free, open source, available at <https://github.com/libjpmul/libjpmul>
- Note that the network hosts and routers must support IP multicast, as indicated above.

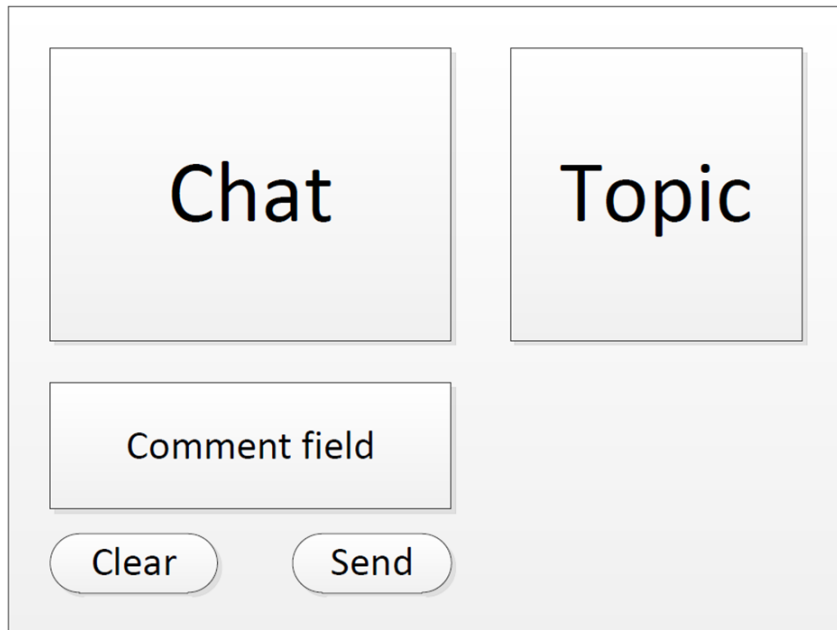
Testing



ACP142

- ACP142 provides several parameters for fine-tuning the protocol's behavior (e.g., MTU size, sending delay between packet fragments, etc.) and it is necessary to configure it to match the capabilities of each network before deployment.
- For more protocol details, see the specification
 - The Combined Communications-Electronics Board (CCEB), ACP142, P_MUL - A PROTOCOL FOR RELIABLE MULTICAST MESSAGING IN BANDWIDTH CONSTRAINED AND DELAYED ACKNOWLEDGEMENT (EMCON) ENVIRONMENTS
<http://jcs.dtic.mil/j6/cceb/acps/acp142/ACP142.pdf>
- Implementation and test details are in a technical report
 - <https://github.com/libjpmul/report>

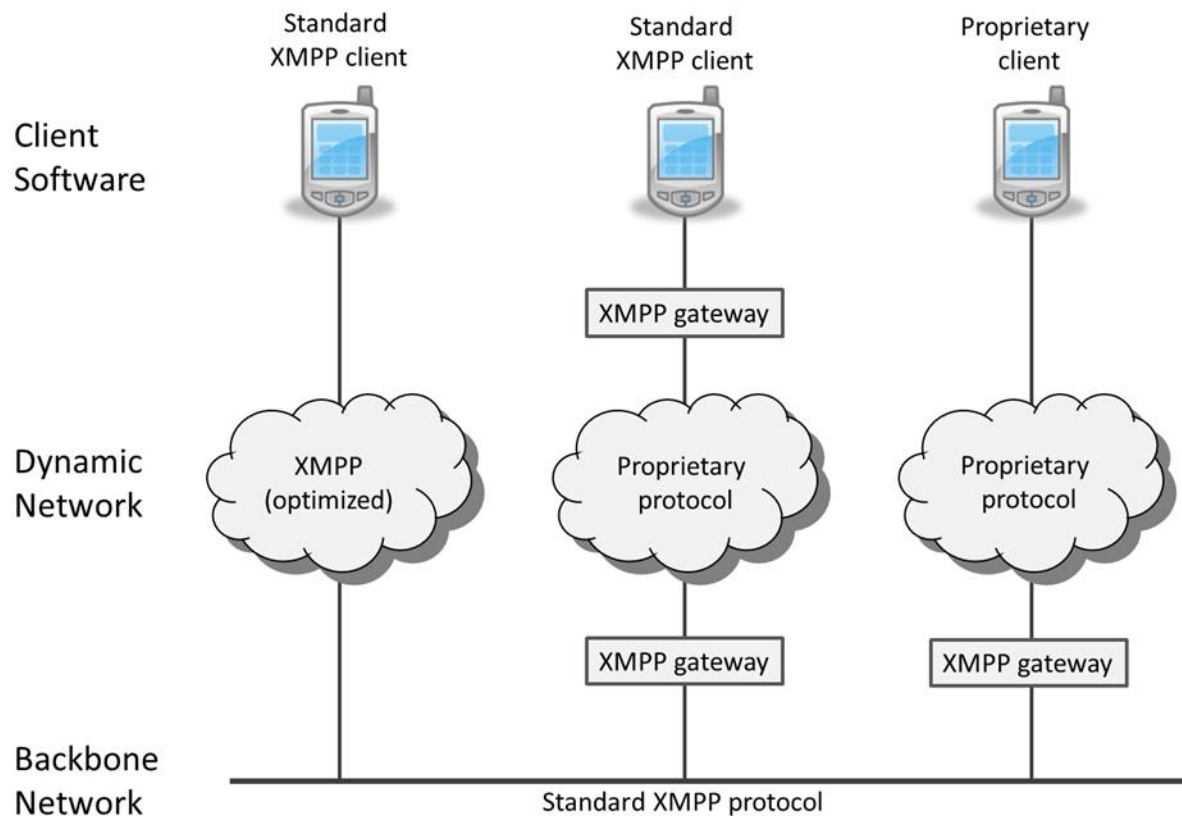
P_MUL chat application



The screenshot shows a chat application interface with a light gray background. It features two large rectangular boxes at the top: the left one is labeled "Chat" and the right one is labeled "Topic". Below the "Chat" box is a text input field labeled "Comment field". At the bottom of the interface are two rounded rectangular buttons: "Clear" on the left and "Send" on the right.

- Chat using ACP142.
- Topics mapped to multicast groups.
- Contribution
 - Free, open source release
 - <https://github.com/libjpmul/pmulchat>
 - Submitted for consideration to the NATO STO/IST-ET-070 exploratory team for tactical chat

A note on interoperability with XMPP



Conclusion

- Contribution – open source:
 - Implementation of **ACP142 over UDP/IP**, and
 - **P_MUL chat** for use in disadvantaged grids leveraging the above protocol.
- Work performed in context of IST-118. Submitted for consideration to the NATO STO/IST-ET-070 exploratory team for tactical chat.
- Future work
 - The IST-118 group plans to experiment with other Core Enterprise Services in disadvantaged grids in the tactical domain as well (such as the Publish/Subscribe service).