The EvoLogics Acoustic Modem
Integration into NURC’s MOOS Environment

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Past Modem Configuration

- WHOI (Woods Hole Oceanographic Institute) Micro-Modems
  - Alliance (top side)
  - OEX Groucho
  - OEX Harpo
- MIT's pAcommsHandler
- EdgeTech (frontseat modem)
pAcommsHandler

MOOSDB

serial line

Micro Modem
What's in pAcommsHandler

DCCL

Queue

Modem Driver

Incoming micromodem messages (goby_nodeedriver)
0/044s9686c7a3a3f308900
15:48:13 | KORAD, F=465
15:48:19 | KORAD, F=500
15:48:26 | KOREV, L=5436, ALV=0,32,0,85,0,0
15:48:30 | KOREV, L=12,12,1,0,0,0,0
15:48:39 | KORAD, F=465
15:48:40 | KORAD, F=500
15:48:43 | KORAD, F=465
15:48:45 | KORAD, F=500
15:48:49 | KORAD, F=465
15:49:07 | KORAD, F=465
15:49:09 | KORAD, F=500
15:49:11 | KORAD, F=465
15:49:12 | KORAD, F=500
15:49:14 | KORAD, F=465
15:49:16 | KORAD, F=500
15:49:18 | KORAD, F=465
15:49:20 | KORAD, F=500
15:49:22 | KORAD, F=465
15:49:24 | KORAD, F=500
15:49:26 | KORAD, F=465
15:49:28 | KORAD, F=500
15:49:30 | KORAD, F=465
15:49:32 | KORAD, F=500
15:49:34 | KORAD, F=465
15:49:36 | KORAD, F=500
15:49:38 | KORAD, F=465
15:49:40 | KORAD, F=500
15:49:42 | KORAD, F=465
15:49:44 | KORAD, F=500
15:49:46 | KORAD, F=465
15:49:48 | KORAD, F=500
15:49:50 | KORAD, F=465
15:49:52 | KORAD, F=500
15:49:54 | KORAD, F=465
15:49:56 | KORAD, F=500
15:49:58 | KORAD, F=465
15:50:00 | KORAD, F=500
pAcommsHandler Message Flow

- MAC
- Modem Driver
- Top Side
- Queue
- Modem Driver
- vehicle

Flow:
- cycle init
- message
- acknowledgement
EvoLogics Modem

- S2C R 8/16
- Sweep-Spread Carrier (S2C)
  - EvoLogics patent
EvoLogics Modem Specs

- Operating frequency band: 7 ... 17 kHz
- Transducer beam pattern: hemispherical
- Working range: 8000 meters
- Interfaces: 2 x RS 232, Ethernet
- Internal data buffer: 1 MB
- Hydroacoustic link: up to 6.9 Kbps in Burst mode
- Sophisticated MAC
- Instant Messaging: 64 bytes @ 976 bps
First attempt: a hack

pAcommsHandler \(\xrightarrow{NMEA}\) MOOSDB \(\xrightarrow{NMEA\ AT...}\) pEvologics

Micro Modem \(\xrightarrow{\text{serial line}}\) iTcpClient

EvoLogics Modem \(\xrightarrow{\text{TCP/IP}}\)
What next?

- Requirements analysis
  - Comms group
  - Autonomy group
- Proper design
- Implementation
- Testing
  - Simulation
  - At sea during June Engineering Trial
Requirements - Comms group

- Routing
- DTN (Delay Tolerant Networking)
- Store and forward
- Alternative MAC layers
- Cross-layer relationships
- Collaboration with other institutes
Solution - Comms group

- Routing
- DTN
- MAC
- DCCL
- Queue
- Modem Driver
Advanced solution - Comms group

Router Policy Engine

DTN Policy Engine

MAC Policy Engine

DCCL

Queue

Modem Driver Policy Engine

PUBLIC RELEASE
Requirements - Autonomy group

- Same as what we have now, but longer range
- Side-by-side use of Micro-Modem, EvoLogics
- iCommander
- Message configuration
- Replacement for iModemSim
- Available for June Engineering Trial
Solution - Autonomy group
NEMO with Micro-Modem
NEMO with EvoLogics
Two Modems, separate use

dccl -> queue -> driver.mit

Micro Modem

dccl -> queue -> driver.evologics

EvoLogics Modem
Two Modems, same DCCL
Two Modems, same queue

dccl

queue

driver.mit

EvoLogics Modem

Micro Modem

driver.evologics
Simulation Setup

vehicle 1

"water"

driver.nevologics

MOOSDB

driver.evologics

vehicle 2

driver.evologics
What does not work?

- `on_demand`
- Acknowledgement Retry for EvoLogics
- Information display: uWitty
Some Initial Results

mission 20110615, messages received on Alliance

groucho micro modem (307)
groucho evologics (446)
harpo micro modem (306)
harpo evologics (503)
Some Initial Results (cont)

mission 20110615, messages received on Groucho

alliance micro modem (292)
alliance evologics (488)
harpo micro modem (94)
harpo evologics (229)
More Initial Results

mission 20110617, messages received on Harpo

alliance evologics (360)
groucho evologics (252)
Distribution

• NEMO is a 'finished' product

• distributed to workshop participants

• please use it, and give feedback!

• merge back ideas into pAcommsHandler?