



MARINE DATA COMMUNICATION & NETWORKING

Pre-requisites: no particular diploma is required, however a certain amount of experience in operating computers is preferable. A personal laptop with dual core processor, min 4 gb of memory and 250 Gb of disk would be an asset to get the maximum of this course. (Recommended: Apple Macbook Pro. 13 with i5 or i7 default configuration, VMWare fusion or equivalent i.e. Virtual Box – Apple Mac are the only hardware able to run natively the three major OS available linux, Mac-OS or MS Windows)

Course Presenter: Arnaud Disant

Technical Advisors: Eamon Harbison, Cormac Gebruers, et al.

Course supported by: [NMCI](#), [CIT](#), [CH Marine](#), [Kestrel Communications](#),

A- Basics Overview:

This is not a course roll out, for details on day by day course roll-out, please see calendar.

A1- Hardware:

- Personal Computers & integrated systems
- Power (ship power - unstable, 24V etc.) & UPS
- switches
- Cabling
- Principle boat/ship systems: engine (control, monitoring & alarm), navigation (key elements, ECS/ECDIS, Radar, gyro, GNSS etc., alarms, sat comms, weather fax etc.)
- Common connection hardware (radar integrator boards "RIBS", moxas, splitters, converters isolators etc.)
- Correct network connection configurations - dual redundancy, parallel over serial network connections, hubs etc.

A2- Software:

- Understanding software licensing (Open Source vs Proprietary, shareware, freeware)
- Operating Systems
- Visualisation – build your own lab
- Microsoft based software (MaxSea, ScanNav, Ship AIS, Transas...)
- Mac OS-X based software (Mac ENC, Polar Nav, Transas iSailor)
- Linux based software (Polar Nav, AIS Dispatcher...)
- Software editors & Internet applications (Maxsea, MacEnc, PolarNav, Marine Traffic)

A3- Data Network:

- Describe how networks function
- Identifying major components



- Functions of the major network components
- Where does it come from (History, OSI, Arpanet, standardisation)
- Basics of TCP/IP (subnet, IP class, public IP etc)
- Command line (SSH, SFTP, Telnet still in use on some iridium systems)

B- Protocols:

- TCP/IP IPV4 & IPV6
- RS232 & RS422
- NMEA 0183 (NMEA 2000?)
- Bluetooth (PAN - port personal area network)
- PPP, EAP and the IEEE 802.1X standard
- Proprietary systems e.g. Raymarine SeaTalk protocol etc...

C- Installation Issues:

- Toolkit (from crimping tools, how to build your own)
- Installation Health and Safety (harness, helmet, dos and donts)
- Cable running & ducting
- Limitation of wireless in commercial vessels (**Faraday**)
- Do's & don'ts of equipment interconnection (buffering / isolation / crosstalk etc.)
- equipment ventilation (Heating / Cooling)
- Equipment & cable shielding
- Physical robustness (shock absorption, vibration etc.)
- Waterproofing
- Fire & explosion retardant/prevention requirements (ATEX etc)
- Lightning & surge protection (Think the more static it gives out the more chances to get stuck, snow creates static)

D- RF/Radio & marine data networking:

- Satellite communications
- Connecting AIS device
- Connecting Radar device
- Network connectivity at sea - sat comms, HF/DL, mobile (3G etc.)
- RF environment - interference
- WIFI & Bluetooth
- Antennas



OBJECTIVES:

At the end of the course a student should be able to build a computer from bare components, install an operating system of his choice on it, configure it. He / she will be able to build / crimp from parts a network cable, connect the computer to the Internet, install a navigation system of his / her choice, including charts and at least one peripheral such as GPS, AIS, etc...