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)

Ref: This course is based on 2009/10 CIT Marine Data Networks revised by Arnaud Disant, Fix-I.T. M.I.S.

Course Presenter: Arnaud Disant
Technical Advisors: Eamon Harbison, Cormac Gebruers, et al.
Course supported by: NMCI, CIT, CH Marine, Transas Marine, Port of Cork, Raymarine, Maxsea, MacENC, PolarNav, Chartworld

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, HFDL, 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...

DELIVERY MODE

The above objective is the minimum required at the end of the course. The agenda above can be delivered in two flavours, basics & advance, the difference lays in the amount of time spent on some modules such as radar integrator boards "RIBS", moxas, splitters, converters isolators, how in depth certain protocol are talked about. This way, the above objective should become the pre-requisites for an advance course. This advance course has not yet been approved by NMCI / CIT.