M.I.T | EUROPE

Maritime Information Technologies

Unified Networks in Shipbuilding

ADCONET

ADVANCED CONVERGENT NETNOLOGY

The idea

No matter what type of vessel, cruise liner, merchant ship, mega yacht or naval craft, they all have standard systems and built in functions. These systems are ship navigation and automation systems, communication and infotainment systems, as well as safety and security systems. They usually run on separate networks, which are not interconnected at all, or only at a very low level. Maritime Information Technologies | EUROPE has developed the "Advanced Convergent Network – ADCONET", which is designed from a ship builder's point of view. It is based on digital network technology (Ethernet).

Requirements specific to shipbuilding have been incorporated into ADCONET – communication cable savings - of more than 50%, easy extension of the network during refits, reduction of weight, less expensive active network components and the minimization of support and maintenance during operation. ADCONET provides a very high degree of redundancy and system reliability, which is of very high importance when it comes to the integration of many different IP based systems.

All non class relevant systems like CCTV, voice over IP, TV over IP, video/audio on demand, PMS, POS, climate control, etc., as well as class relevant services like fire detection, public address and general alarm systems require an IP based (internet protocol) interface. ADCONET fully supports incorporation of safety and non safety relevant systems in one common network if required.

In general, ADCONET handles different systems and services using current industry standards and protocols (IEEE, ISO, IEC, RFC, etc.). ADCONET guarantees high availability and no backward interference between the connected systems. This means full separation of the information flows on the network. ADCONET is designed to fit into all ships, from small yachts, river cruise vessels, merchant ships, up to the biggest ocean liners.

The technology

ADCONET is an Ethernet based IP network utilizing a fiber optic backbone. It provides VLAN technology and priority mechanisms to guarantee a complete separation of all connected services and systems. It uses an optimized access layer structure using the "Access Control Station – ACS", which is based on commercial off the shelf components (COTS). Along with general access layer functionality, the ACS contains all interfaces for non class relevant systems and services. The ACS will be interconnected in a daisy chain connection, which will lead to massive savings of communication cable and installation time. Most of the cables can be pre-wired by the cabin manufacturer.

All class relevant services will be separated from the ACS and use the "Distribution Control Station – DCS", which is also based on COTS equipment. DCS will typically be installed one per deck per MFZ, also in a daisy chain. The DCS houses, for instance, the IP line card of the fire detection system and the IP interface and amplifiers of the PA/GA system. All IP based safety systems can run on the ADCONET without modifications, as long as they fulfill SOLAS requirements. ADCONET can be installed using fiber optic cables, copper cables or a combination of both, to get the best price/performance for the specific installation.

The network components

The ADCONET infrastructure is assembled from selected standard network components, available from well-known manufacturers. The backbone switches ensure sufficient data flow throughout the fire zones.

Distribution switches are available in each MFZ to regulate data flow and provide links to the ACS and DCS chains. Each distribution switch is connected to a configuration and network management station (COMS). The network management system is distributed over all MFZ. This prevents the loss of control over the network. In case of total damage of a MFZ, all other MFZ will still remain 100% functional.

All central systems (servers etc.) are connected either to one or to both distribution switches within a fire zone. The Access and Distribution Control Stations (ACS, DCS) are the interfaces to all end devices (clients). The latest standard IP protocols are implemented to support a wide range of applications and systems.

Components of safety relevant systems - such as the fire detection system (FDS) and public address and general alarm system (PA/GA) are connected exclusively to the DCS, while all other non safety systems are connected to the ACS.

The ADCONET demo center

An ADCONET/BESST demo center was installed at the M.I.T premises in Hamburg, Germany for demonstration, test and certification purposes. The setup depicts a vessel with three main fire zones, simulating a realistic environment for all today's and future test cases.

The following systems are currently installed:

Standard IP services

CISCO, USA	Active network components, voice over IP, WLAN
Alcatel-Lucent, France	Voice over IP
NEC, The Netherlands	DECT over IP
newVoice, Switzerland	MobiCall alarm and messaging system
Allin, USA	HD interactive TV
Wempe, Germany	Master clock
Huber&Suhner, Switzerland	Fiber optic breakout cable

Safety Systems

Consilium, Sweden	Fire detection system
Honeywell/Esser, Germany	Public address, general alarm
MariMils, Finland	Low location light

Ship Security Systems

Axis, Sweden	HDTV IP video surveillance system
SeeTec, Germany	CCTV management system

The ADCONET roadmap

ADCONET V1 is now available in a standard convergent version to connect all non safety systems. A distributed Network Management System (NMS) with an automatic configuration system (COMS) will be available in ADCONET V2. In an advanced convergent version, ADCONET V3 will connect also safety relevant services. Our list of partner companies who have committed to integrate their IP based systems on ADCONET continues to grow. Because of all these attributes, ADCONET is the first digital network in the world of this kind. ADCONET is in a constantly evolving development process to host as many as possible IP based ship systems.

BESST[1]
Breakthrough in European Ship and Shipbuilding Technologies

The partners

ADCONET was selected by the European Community funded project BESST as the base for sub-project VIII.2 “Integrated IT networks for essential services”. Other members of the VIII.2 sub-project, alongside M.I.T, are:

- Meyer Yard from Germany
- STX Europe from France
- Fincantieri from Italy
- Balance from Germany
- Bureau Veritas from France.

During this project, class relevant services will be added and certified for use as the common standard in the maritime industry. International maritime component and system suppliers have committed to support ADCONET.

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ADCONET is also supported by and available from our major partners.

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