

subC-net Communications and Power Hub for Subsea and Downhole Devices

APPLICATIONS

- Advanced communications hub for instrumented subsea fields
- Subsea TCP/IP network
- Downhole and subsea data processing and storage
- Information-deficient subsea wells or fields
- Extended-reach subsea tieback field developments

BENEFITS

- Simple, seamless integration of multiple-vendor downhole and seafloor monitoring and control devices
- Flexibility in the implementation of instrumentation
- Design that allows upgrades without production shut-in
- New level of seafloor and downhole surveillance
- Minimized surface monitoring equipment and software
- Improved reliability for the standard production control system

FEATURES

- Remote real-time monitoring and diagnostics with an optical link greater than 100 MB/s
- Open-architecture subsea network
- One-to-one communications tunneling
- Intelligent Well Interface Standardisation (IWIS) compliant
- Simultaneous support for multiple subsea communication protocols
- Capacity to integrate Schlumberger and third-party interface cards
- Scalable and configurable
- Network management features, including dedicated virtual LANs for each device on the network
- Self-diagnostics and internal measurements
- Retrievable with standard work-class remotely operated vehicles
- ISO 13629 part 6 compliant

The Schlumberger subC-net module facilitates subsea surveillance for integrity, production, and process systems. It is a communications and power hub that enables surface equipment to communicate directly with subsea and downhole equipment and that extends the host facility communications network to the seabed. It also provides local communications links for internal interface cards and external I/O modules, including production

sensors, flowmeters, and sand detectors. The module enables a subsea LAN to be established that connects the operator to the reservoir and the extended wellbore system. The open (plug-and-play), flexible system is IWIS compliant, so that Schlumberger and third-party instrumentation can interact seamlessly.

Experts in reservoir evaluation, intelligent-well completions, seabed monitoring and controls, and subsea system interfaces have designed the subC-net platform. Integrated subsea surveillance facilitates the key functions that drive subsea productivity.

SYSTEM COMPONENTS

The subsea surveillance system consists of a single topside data hub (TDH), which links one or more subC-net modules, via the topside umbilical termination assembly, to the master control station, the historian, the shore-side communications link, and other data access points.

The subC-net module contains the processor, I/O components, optical or electrical modems, internal diagnostics, and expandable nonproprietary capacity for third-party devices. A single power supply supports all the electronics within the module.



The subC-net module (right) and its receptacle (left).

INSTALLATION

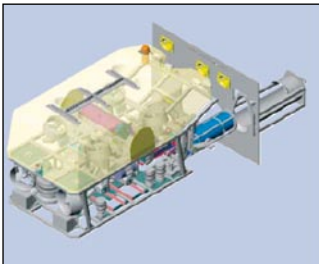
The subC-net module can be installed on a subsea production tree, a manifold, a mud-mat, or a subsea distribution unit, and is powered by distribution from dedicated power lines or a production control system. The module can be mounted vertically or horizontally on the structure using a remotely operated vehicle with a flying-lead orientation tool, and it can be locked or unlocked using a standard API torque bucket.

INDEPENDENT SURVEILLANCE SYSTEM

There are two major advantages of having a discrete subC-net system for surveillance. First, the production control system operation is kept separate from reservoir and production instrumentation connectivity. Second, the subC-net system can be upgraded without interrupting production as technology evolves.

POWER AND COMMUNICATION, AND TRANSMISSION RATES

The subC-net module can provide high-power electrical outputs to operate downhole electric flow control valves, downhole reservoir instrumentation, subsea flowmeters, and other electrical devices. This versatile module provides support for multiple subsea communication protocols and can be configured to interface device-specific protocols directly with the subsea network.



A remotely operated vehicle installing a subC-net module horizontally.

The TDH can communicate with the subC-net module over redundant dedicated fiber-optic or electrical lines to create a surface/subsea TCP/IP network. The bandwidth provided by the optical modems is self-adapting and permits transmission rates up to 100 MB/s.

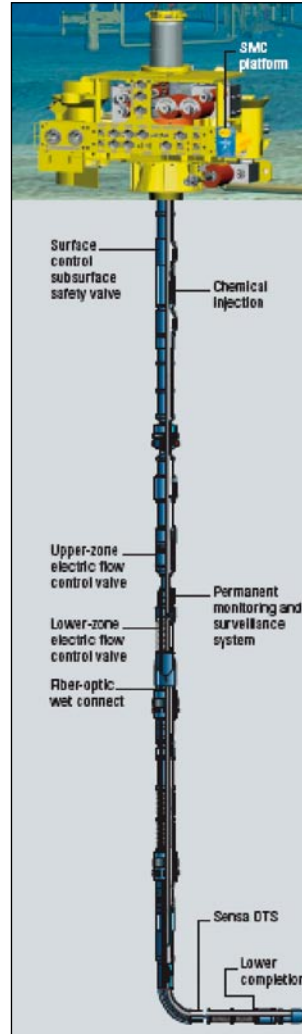
SELF-DIAGNOSTICS AND INTERNAL MEASUREMENTS

The subC-net module has diagnostic sensors that aid in faultfinding and prediction for the subsea electronics equipment. Alarms are generated on the TDH if a fault or an error condition is detected:

- internal temperatures, pressures, and humidity
- input power voltage and current
- vibration in three dimensions
- internal and external supplied power, voltage, and current.

RELIABILITY

The subC-net module has been fully evaluated and passed rigorous qualification tests. All its system electronics underwent the extended Schlumberger electronic-design-for-manufacture process, with continuous component obsolescence tracking. All the components identified as critical in reliability-and-maintainability analysis are fully redundant.



A multiphase flowmeter, a pressure and temperature sensor, a fiber-optic distributed temperature sensor, flow control valves, and a horizontally subsea-tree-mounted subC-net module.

SPECIFICATIONS

Input power [†] , V AC; Hz	110–264; 47–63
Diameter, in	12.25
Length [†] , in	20
Weight in air [†] , lbm	450
Operating temperature range, °C	0–40
Storage temperature range, °C	–18–50
Pressure rating, psi	5,000
Water depth, ft	10,000
Shock rating	10G, 11-ms half sine
Vibration rating:	25–150 Hz 5G acceleration
	5–25 Hz ±2 mm displacement
Environmental stress screening testing	ISO13628 part 6

[†]Other options available on request.

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