ASN the global leader in the submarine networks business

A fully integrated global provider

The leading light in submarine telecoms

Breaking new ground in the Oil & Gas, Defense & Security sectors

World renowned after-sales service

Thought leadership through our people
Full turnkey supplier

Route Planning

Marine Survey

Permits

Design

Manufacturing

Marine Lay

Installation & Commissioning

Support & Maintenance
Offering full turnkey submarine systems across all markets and locations

<table>
<thead>
<tr>
<th>CONCEPTION &amp; PRODUCTION</th>
<th>INSTALLATION</th>
<th>SERVICE LIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine survey</td>
<td>Marine lay</td>
<td>3 CABLE SHIPS</td>
</tr>
<tr>
<td>Permits</td>
<td>Civil works</td>
<td>• Installation of submarine cable systems</td>
</tr>
<tr>
<td>Design</td>
<td>Installation &amp; commissioning</td>
<td>CIVIL WORKS</td>
</tr>
<tr>
<td>Manufacturing</td>
<td></td>
<td>• In-house civil works experts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FULL CONTROL OF WORKS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• End-to-end management of the whole system from installation to commissioning</td>
</tr>
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</tbody>
</table>

**MARINE ENGINEERING**
- In-house capabilities (routing, permitting, etc.)

**NETWORK ENGINEERING**
- Technical expertise and 30,000km of fiber for lab test

**MANUFACTURING**
- Full control of manufacturing process, with 3 factories in Calais, Greenwich and Trondheim

**SAME OPERATING PROCESS**
- Same operating process in all geographies

**STRONG CONTROL OF QUALITY**
- Strong control of quality to deliver highly reliable system

**HIGHLY FLEXIBLE ORGANIZATION**
- Highly flexible organization with proven track-record to control risk of implementation and deliver on time

**COST OPTIMIZATION**
- Cost optimization throughout the project lifetime
More than 160 years of experience

1854
Cable factory established in Greenwich (UK)

1891
Cable factory established in Calais (France)

1994
Alcatel France acquires STC (UK) and becomes Alcatel Submarine Networks (ASN)

2014
ASN acquires Optoplan (Norway)
Worldwide presence

- **Trondheim, Norway**
  - R&D, Commercial Office
- **Calais, France**
  - Manufacturing, R&D, Cable depot, Port Base
- **Greenwich, UK**
  - Manufacturing
- **Paris-Saclay, France**
  - HQ, R&D, Commercial Office
- **Hong Kong**
  - Commercial Office
- **Cape Verde**
  - Cable depot, Port Base
- **Taiwan**
  - Cable depot, Port Base
- **Miami, USA**
  - Commercial Office
- **Rio de Janeiro, Brazil**
  - Commercial Office
- **Sydney, Australia**
  - Commercial Office

- **1,800 Employees & contractors worldwide**
- **650,000 km of optical cables deployed**
- **330,000 km of submarine cables maintained**
- **6 3 cable ships for installation 3 maintenance vessels**
Our pillars

Leading and reliable optical technology
High capacity
Networking flexibility
25-year long-term support

Comprehensive portfolio
Telecom systems
Oil & Gas
Defense & Security

50,000 km per year
The largest manufacturing capability in the industry

650,000 km
of optical cables deployed
Our strategic areas of expertise

Telecoms  Oil & Gas  Defense  Services
innovation and reliability are an integral part of ASN’s DNA
## Internet players (OTTs)

## Telcos

## Private investors

<table>
<thead>
<tr>
<th><strong>Telecoms</strong></th>
<th><strong>Connectivity / Capacity</strong></th>
<th><strong>Reliability</strong></th>
<th><strong>Full Turnkey &amp; Open Systems</strong></th>
</tr>
</thead>
</table>

### SDM
- Cost optimizing solutions
- Fiber pair business granularity
- An enabler for capacity & highest distance

### Pop-to-Pop
- Extension of submarine services up to PoP*
- Allowing optical transparency

### Unrepeatered
- Low cost solution for short distance (< 400km)
- Can be fully integrated with a repeated system

### Capacity Upgrades
- Allowing maximisation of fiber pair capacity
- Unique project team experience
- Bringing capacity to any network
- Fully integrated

*PoP: Point of Presence*
### Architect of e-field*

**Platform Connectivity**
- An enabler for remote operations
- Allowing real time, high bandwidth, reliable communications
- Irrespective of weather conditions

**Sensing (DAS* & PRM*)**
- Permanent reservoir and overburden monitoring
- Pipeline and downhole monitoring
- Asset integrity

**Powering (DC/FO*)**
- Infrastructure standard for subsea control
- Enabler for all electric fields
- Powering unmanned platform

---

**Remote operation of O&G fields**

*e-field*: Digitalization and electrification of offshore fields  
**DAS**: Distributed Acoustic Sensing  
**PRM**: Permanent Reservoir Monitoring  
**DC/FO**: Direct Current and Fiber Optics

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*Alcatel Submarine Networks - Confidential*
Defense
Reliable Cable Systems for Subsea Surveillance

<table>
<thead>
<tr>
<th>Military Applications</th>
<th>Civil Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-submarine &amp; electronic warfare</td>
<td>Infrastructures, oil &amp; gas, utilities</td>
</tr>
</tbody>
</table>

### Defense

**Passive Acoustic**
- Critical asset protection (harbor, pipeline, submarine cables)
- Coastal security (submarine and surface threats)

**Powering**
- Power for subsea supervising station (drone docking stations, multi-sensor platform, active/passive sonars…)
Services

Dry-Wet
Integrated Services
Innovative Support
Unrivalled Expertise

Ad-hoc solutions: tailored solutions just in case standard solutions (APMA or APMMSA) can’t be used.

<table>
<thead>
<tr>
<th>Services</th>
<th>Telcos</th>
<th>Private Investors</th>
<th>OTTs</th>
<th>O&amp;G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Services Contracts (GSC)</td>
<td>• Technical Assistance • Hardware Repair</td>
<td>• AIS • Land Cable</td>
<td>• NOC • A-DCN</td>
<td></td>
</tr>
<tr>
<td>On-Demand Services (ODS)</td>
<td>• Equipment upgrade • Wet plant testing</td>
<td>• Training • Coaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine Maintenance</td>
<td>• Atlantic agreement • Asia Pacific agreement</td>
<td>• Ad-hoc solutions* • Depot, spare management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recycling</td>
<td>• Dry recycling (station equipment) • Decommissioned cable recycling</td>
<td></td>
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</tbody>
</table>
Support throughout the Project
25-year long-term support

Dedicated Teams of Experts
Technical, project management, maintenance and finance

ASN is Focused on Customers’ Requirements and Expectations
Helping our customers meet their requirements and expectations by adjusting them throughout the project life cycle when deemed necessary
Reliability, Quality, Safety & Environment

ASN equipment is reliable and complies with all the key international standards

- **Quality Certificates**
  - ISO 9000 / TL9000 (Paris-Saclay, Calais and Greenwich)
  - ISO 90001 (ASN Norway)

- **Environment Certificates**
  - ISO 14001 (Calais and Greenwich)

- **Health and Safety Certificates**
  - OHSAS 18001 (Calais, Greenwich and ASN Norway)

- **QHSE Organization**
ASN: a worldwide leader in submarine networks

Submarine networks market shares from 2013 to 2018

- ASN: 33%
- SUBCOM: 22%
- NEC: 18%
- Others: 27%
- Others: 27%

ASN
33%

Submarine networks market shares from 2013 to 2018
OTTs are becoming the largest investors in submarine networks

OTT Long Haul projects

<table>
<thead>
<tr>
<th>Year</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>Faster, GTT</td>
</tr>
<tr>
<td>2015</td>
<td>Monet, AEConnect, NCP, Tannat</td>
</tr>
<tr>
<td>2016</td>
<td>Hawaiki, Marea, Brusa</td>
</tr>
<tr>
<td>2017</td>
<td>Indigo, HK-Guam, PLCN, Jupiter, HKA</td>
</tr>
<tr>
<td>2018</td>
<td>Havfrue, SJC2, JGA, Curie, Dunant, Equiano, Malbec, Havhingsten</td>
</tr>
</tbody>
</table>

XX% Share of OTTs (as % of total orders)

# of OTT long haul projects
Innovation is ASN's DNA

4 Research & Development sites

Paris-Saclay, Greenwich, Calais and Trondheim, with a team of more than 300 experts

Recognitions

2018 - Platform connectivity with GBOOC, ExxonMobil
2017 - Calais training school certification
2016 - Awarded AFIAP Prize with Total
2016 - Medal of Innovation from the city of Calais
2015 - Bell Labs President Award for “Agile Branching Unit”
2014 - CSR Medal for the cable recycling activity
8 Queens Awards for export and technology since 1983
An innovation house

SDM
By ASN

Best-in-class technology upgrades
SOFTNODE

DC/FO

Distributed Acoustic Sensing
ASN leading design shift towards SDM

Disruptive and Innovative Solution
Cable Capacity Increase
Fiber Pair Management

<table>
<thead>
<tr>
<th>System</th>
<th>• Spatial Division Multiplexing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Products</td>
<td>• Highest FP count repeater on the market (16FPs)</td>
</tr>
<tr>
<td></td>
<td>• New conductor with the same performance: Aluminium cable</td>
</tr>
<tr>
<td></td>
<td>• Fiber with the best tradeoff Quality vs. Cost: 80µm²</td>
</tr>
<tr>
<td>Technologies</td>
<td>• Highly reliable technology with pump farming</td>
</tr>
<tr>
<td></td>
<td>• Doubling of the number of FPs: 16FPs</td>
</tr>
<tr>
<td></td>
<td>• Low effective area leading to the best tradeoff Quality vs. Cost</td>
</tr>
<tr>
<td></td>
<td>• 2nd conductor source</td>
</tr>
</tbody>
</table>
The submarine network

A complex integrated system, with high performance and reliability expectations
ASN assets strengthen a leading position

**RESEARCH & DEVELOPMENT**

- R&D team of more than 350 experts dedicated to new product development, qualification and industrialization
- A unique transmission laboratory equipped with more than 30,000 km of fibers (>300 submerged repeaters)
- A full set of facilities for power feed, cable and submerged equipment development and qualification
  - High voltage (>15kV) laboratories
  - Bump & vibration test-bench
  - 1000 bars pressure vessels
  - Material sciences laboratories
  - Up to 1000 kN tensile test bench for cable & accessories
  - Long-length (1km) water penetration testing facility
  - Paris-Saclay: Dry + Wet plant Integration lab
  - Paris-Saclay and Greenwich: High voltage laboratories
- SLTE development, validation & integration platforms
- Fiber sensing laboratory for seismic and acoustic applications

**Industrial Operations**

**Marine Operations**
ASN assets strengthen a leading position

INDUSTRIAL OPERATIONS

Manufacturing of submarine networks is carried out in three plants:

- Calais (160,000sqm): cable manufacturing, system integration & testing, ship loading, cable recycling
- Greenwich (16,000sqm): manufacturing of amplifiers, repeaters, Branching Units, ROADM, PRM sensors and other submerged equipment, assembly and acceptance tests for SLTE and PFE
- Trondheim (4,450sqm): manufacturing of fiber grating and instrumentation

Integrated supply chain with a dedicated logistics center, components supplied by certified suppliers.

All products are tested throughout the manufacturing cycle to ensure a very high degree of reliability.
ASN assets strengthen a leading position

Since March 2015, ASN has been owning its fleet of vessels and heavy duty equipment (ROV, plough).

ASN Marine, a subsidiary of ASN, is the owner of the fleet.

Louis Dreyfus Armateurs, a strategic partner of ASN, manages our fleet providing crews, maintenance & services.

ASN's Marine Operations are also responsible for engineering of deployed systems, underwater and land cable engineering, operational permits, operational management of specialized subcontractors, deep burial cable landing, post-lay inspection (PLIB).
... with a fleet of first-class cable ships

ASN has been operating and owning 6 vessels since March 2015

- 3 vessels for installation, laying and burial (sistership)
- 3 maintenance vessels for underwater communication networks
- Installation vessels may lay a maximum of 200km of cable per day up to 8000m deep (20km per day in plough burial operations)
- ASN and Louis Dreyfus Armateurs (LDA) have been partnering for many years, building and operating one of the best fleets of cable ships:
  - Since 2001, LDA has been the Ship Manager of the ASN fleet, providing technical expertise in marine installation and maintenance
  - This partnership has been renewed through a Ship Management agreement valid until 2020

### Installation vessels

<table>
<thead>
<tr>
<th>Ile de Bréhat</th>
<th>Ile de Batz</th>
<th>Ile de Sein</th>
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</thead>
<tbody>
<tr>
<td>Alcatel Submarine Networks Marine – Owner / Operator</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Maintenance vessels</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Ship Manager</th>
<th>Louis Dreyfus Armateurs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length overall</td>
<td>140.36m 140.36m 140.36m 151.54m 143.40m 87.40m</td>
</tr>
<tr>
<td>Breadth</td>
<td>23.40m 23.40m 23.40m 20.50m 21.60m 19m</td>
</tr>
<tr>
<td>Draft</td>
<td>8.0m 8.0m 8.0m 7.8m 7.5m 5.1m</td>
</tr>
<tr>
<td>Accomodations</td>
<td>60/5x2 crew 60/5x2 crew 60/5x2 crew 13/64x2 crew 40/10x2 crew 14/23x2 crew</td>
</tr>
<tr>
<td>Plough</td>
<td>Plough SMD HD3 1500m Tow 130T Share 2.3m/3m Plough SMD HD3 1500m Tow 130T Share 2.3m/3m Plough SMD HD3 1500m Tow 130T Share 2.3m/3m</td>
</tr>
<tr>
<td>ROV</td>
<td>ROVJet 400 HP 2500m / 2m burial Dynacon ext.frame LARS Dynacon ext.frame ROVJet 400 HP 2500m / 2m burial Dynacon A-Frame ROVJet 400 HP 2500m / 2m burial Heila crane ROVJet 400 HP 2500m / 2m burial Dynacon ext.frame</td>
</tr>
</tbody>
</table>
ASN has been owning and operating 6 vessels since March 2015

3 vessels for installation, laying and burial
3 maintenance vessels for submarine communication networks
Louis Dreyfus Armateurs is the ship manager
ASN cares about the environment

Recycling
2 dedicated industrial lines have been implemented in Calais for decommissioned cable recycling

Route Planning
A thorough examination of the route during bidding preparation ensures seabed respectfulness

Environment Certificate
Calais and Greenwich: ISO 14001
Upstream Financial Support
Assistance in due diligence, connection with selected partners, business plans assessment

Funding Solutions
Internal solutions or ECA-supported structures or commercial banks

Customization of Contractual Securities
Close cooperation with customers to bring contracts into force
They trust ASN

More than 120 deployed and active cables
Caribbean
Northern Europe
Middle East