Solutions for Onshore-Offshore Communications
Microwave Solution the Oil & Gas Industry
The #1 Wireless Backhaul Specialist

Real Time Mission Critical Microwave Solutions

Resilient  Powerful  Marine Grade
Offshore Communications Trends

- Integrated operations
- Deep-water projects with floating installations
- Complex wells need monitoring and surveillance
- Availability and reliability
The Digital Oil Field

- Integrated Operation/Field Automation
- Video conferencing
- Voice & Data communication
- Workforce management
- Security/Surveillance
- Environment monitoring
- Employee infotainment

Secure and reliable high capacity communication to remote and harsh conditions

PtMP Sector
PtP Microwave with Stabilized antenna
Supply/Stand-by vessels

FibeAir 2000/2500

FibeAir IP-10/IP-20

PointLink

FibeAir 2000/2500

Onshore Operations

Fixed Rig

PtMP Sector

Facility Management

FPSO

PointLink

FibeAir IP-10/IP-20
Powerful

Industry-leading system gain

• High system gain
• No Single Point of Failure
• 2048QAM with high Tx power
• Advanced Carrier Ethernet
### Resilient

#### Robust and Reliable Backhaul

- **No Single Point of Failure**
  - Multiple levels of protection
- **Radio MTBF**
  - 110 years
- **Diversity**
  - Frequency, Space and Quad Diversity
- **Adaptive Coding & Modulation**
  - Keep link up and running in harsh conditions
Future Proof

Robust and Reliable Backhaul

- **Fully programmable packet service delivery**
  - Network-processor based services core
  - Hybrid – TDM & Ethernet/IP

- **Multi-technology node for LMR and for future 4G/LTE evolution**

- **Multi-Carrier support (MC-ABC)**
  - Up to 8 carriers per group (8+0)
  - Up to 2.5Gbps per group

- **High Modularity**
Resolving hauling challenges across entire networks

Leading Solutions for Short Haul & Long Haul

Ceragon Portfolio

End-to-End Network Management

Access
- IP-10C
  All outdoor
- FibeAir70
- FibeAir2500
  Sub6 GHz
  PtMP

Aggregation
- IP-10G
- IP-20S
- IP-20G
- IP-20C

Backbone
- IP-10N
- IP-20N
- IP-20G
- IP-20LH
  All-Indoor / Split Mount
PointLink Solution
Oil & Gas exploration offshore is costly

OPEX 2M$ per DAY!!!
Special requirements

• Health, Safety and Environment (HSE)
  • Safety is #1 issue for offshore operations
  • Documentation, processes and auditing

• Corrosive environment
  • High level of saline water in the air

• ATEX - Atmosphere with explosive gasses
  • Zone 0 - Area in which an explosive gas-air mixture is continuously present or present for long periods.
  • Zone 1 - Combustible or conductive dusts are present. Area in which an explosive gas-air mixture is likely to occur for short periods in normal operation.
  • Zone 2 - Area in which an explosive gas-air mixture is not likely to occur, and if it occurs it will only exist for a very short time due to an abnormal condition.
Need communication to offshore real estate?

Wireless Provides Optimal Technology for the Digital Oil Field
When things moves

- Floating installations move with waves even if anchored
- FPSOs rotate around the turret
- Microwave antennas have a narrow beamwidth, causing loss of signal when the antenna points off target

- Target aiming based on highly accurate GPS/Gyro information
Configuration examples

- **Fixed Antenna**
  - 1+0/1+1/2+0

- **Fixed Antenna PointLink**
  - 1+0/1+1/2+0

- **Space Diversity**
  - 1+0/1+1/2+0

- **PointLink**
  - 1+0/1+1/2+0

- **Dual Sector PointLink**
  - 1+0/1+1/2+0

- **Onshore site**
  - Fixed rig
  - TLP or SS rig
  - FPSO

- **Fixed rig**
  - 1+0/1+1/2+0

- **Space Diversity**
  - 1+0/1+1/2+0

- **TLP or SS rig**
  - 1+0/1+1/2+0
PointLink Mk. II

**Stabilized Antenna**
- Antenna sizes: 1.2 to 2.0m
- Frequency: 4 – 18.0 GHz
- Pointing accuracy: ±0.2°
- Maximum angular velocity: Az ±8°/s
- Maximum acceleration: Az ±5°/s²
- Angular travel: Az 310° (Option 510°)

**Radomes & Weights**
- 1.2 m antenna: 1.80 m radome, 450kg
- 2.0 m antenna: 2.90 m radome, 1150kg
PointLink Mk. III Dual axis system

- **Stabilized Antenna**
  - Antenna sizes: 0.3 to 0.6m
  - Frequency: 4 – 18.0 GHz
  - Pointing accuracy: ±0.2°
  - Maximum angular velocity: Az ± 10°/s
  - Maximum acceleration: Az ± 20°/s²
  - Angular travel: Az 310°

- **Radome & Weight**
  - 0.3, 0.45, 0.6 m antenna
  - 0.90m radome, ~115kg

0.6m antenna
Typical Indoor Rack (Single antenna system)

- Rectifier 48VDC and DC distribution
- Evolution IDU
- Gyro/GPS display unit
- Display and keyboard
- Control PC
- AC distribution (behind panel)

Position, heading and gyro information

Azimuth and Elevation commands
Leading Microwave Technology

XCVR/ODU unit:

- The transceiver covers a complete frequency band – single spare!
- Capacity and modulation independent (covers 8 - 450 Mb/s)
- Adaptive Modulation (4 - 1024QAM)
- Direct RF modulation with adaptive power amplifier control
- High Transmitter Power (~30dBm)
- 20 dB ATPC range
- Same unit for Indoor and Outdoor

Optional IF Combiner Space Diversity with 3dB combiner gain
**TCO analysis – PointLink vs. VSAT**

### Total cost of ownership of VSAT vs. PointLink solution

<table>
<thead>
<tr>
<th>Months</th>
<th>VSAT 512kb</th>
<th>VSAT 4M</th>
<th>PointLink 10M</th>
<th>PointLink 100M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost ($)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* : Space segment, teleport charges, etc

<table>
<thead>
<tr>
<th></th>
<th>PointLink</th>
<th>VSAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurring cost</td>
<td>Low</td>
<td>High *</td>
</tr>
<tr>
<td>Capacity</td>
<td>10 – 100s Mb/s</td>
<td>256 kb/s – 4 Mb/s</td>
</tr>
<tr>
<td>Latency</td>
<td>Ultra Low (sub ms)</td>
<td>High (~1s)</td>
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<tr>
<td>QoS</td>
<td>8 levels QoS</td>
<td>Basic</td>
</tr>
<tr>
<td>Availability</td>
<td>99.95 – 99.999 %</td>
<td>99.7 %</td>
</tr>
</tbody>
</table>
Norway - The Longest Offshore Link in the World

**Background**
- All infrastructure in the Yme-field was earlier removed, but technology advancement made possible the reopening of operations

**The Challenge**
- Customize a MW solution from the long distance requirement with the on-shore needed ellevation
- Submitting fiber to a single platform a too expensive alternative
- Satellite communication too low bandwidth for this project (appx. $40K per 4 Mbps)

**The Solution**
- 4 x 32Mb/s with bandwidth aggregating giving 128Mb/s (due to too much diffraction loss)
- ATEX EExP Zone 2 PointLinks (2.0m)
- Quadruple Space Diversity for maximum redundancy
Over-water offshore link to a rotating vessel BP Skarv FPSO
Thank You