

Cuba-Venezuela Submarine Project Benefits 2/2

Alcatel Shanghai Bell is the safest and most reliable partnership to ensure long-term viability combined with international credibility for a project of this magnitude

ASB is the only Chinese partner able to provide turnkey submarine solution with in-house field proven products and total independancy.

ASB offer is fully compliant with Venezuela Cuba technical specifications:

- **Environmental issues, high water depth, pressure resistance, sea bed conditions**
- **Field proven product for current needs and future project evolution (2 Branching Units)**
- **All product fully qualified, field proven and whitout US patents**
- **Full repect of Embargo regulation**
- **Technology transfer with comprehensive documentation, in depth O&M training including refresh courses**

Cuba-Venezuela Specific Topics

Embargo

- Alcatel, Alcatel Shanghai Bell, Alcatel Submarine Networks are committing to deliver the project while respecting Embargo policy
 - Alcatel group and ASN are french registered companies
 - Alcatel Shanghai Bell is a chinese registered company
 - Specific embargo clauses will be part of the T&C's to ensure our commitment for the whole life of the project

Operation & Maintenance, Technology Transfer

- Comprehensive documentation will be provided (in Spanish)
- Thanks to our experience we have setup dedicated O&M training module to ensure independency and autonomy of Local O&M teams
- Refresh courses are also available to maintain team proficiency

Solution & Capabilities

	Alcatel-Lucent	Huawei
Submarine System Design (25 year life time)	X	No - Terrestrial
Submarine Test Bed	X	No - Terrestrial
Submarine Line Terminal	X	No - Terrestrial
Cable	X	No - Nexans
Repeaters	X	No - Red Sky
Vessel Fleet	X	No - GMSL
O & M services	X - Dry and wet	No - GMSL for wet

Wet Plant

URC1 cable (Nexans)

1. no vault design , cannot be deployed above 1500m. On Cuban side water depth is more than 5000m
2. is only suitable for shallow water conditions (> 1500 m) and UNREPEATERED APPLICATIONS ONLY: no vault, no copper conductor, no operational margin commensurate with repeatered solution deployment.
3. Only 3000 km have been installed all below 1000 m

OALC5 cable (ASB)

1. vault design , can be deployed and recovered down to 8000m
2. More than 250 000 Km OALC optical package

Repeater

ASB proposal :

1. ASN repeaters; No US component & No US patent
2. Over 4300 have been installed without any failure

Huawei proposal :

1. Red Sky repeaters US component & 41 US patents
2. Not a single repeater has been deployed as of yet

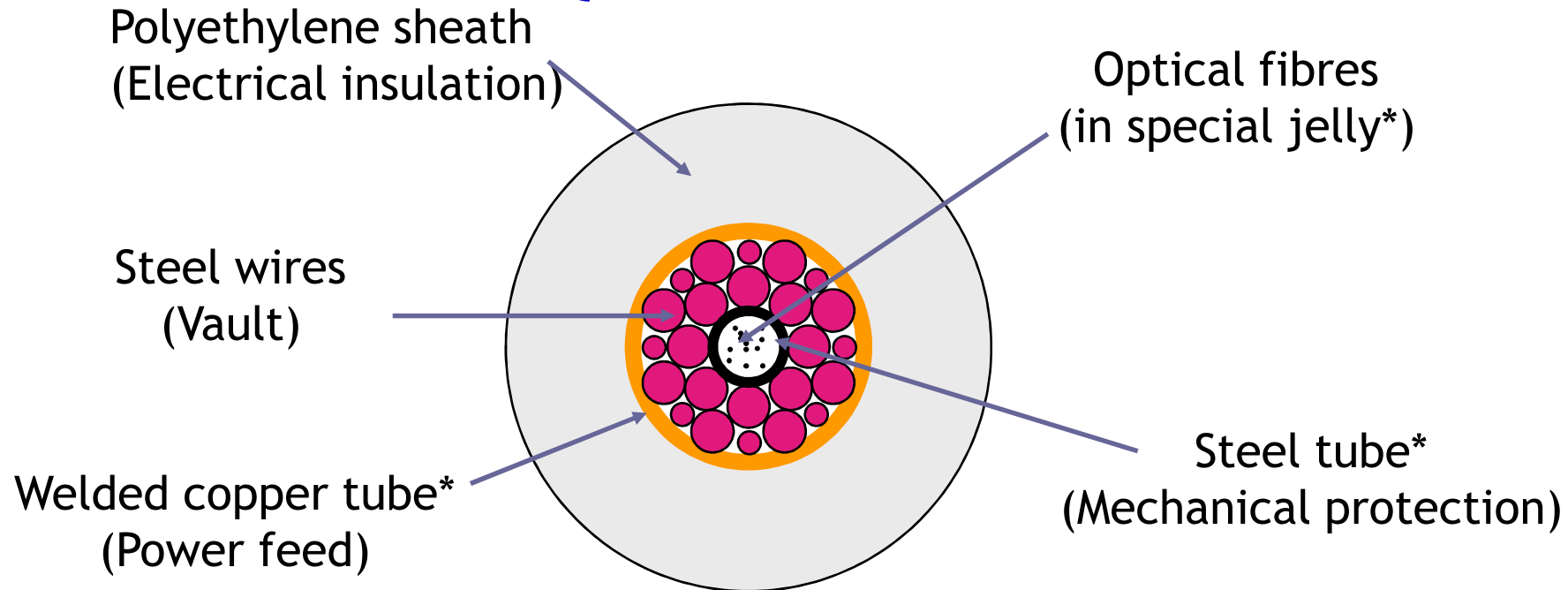
System assembly before loading (ensure that link is working well before loading)

Not possible in Rognan factory (Nexans)

Possible in Calais (ASN factory) System assembly and full integration will be done in Calais

The OALC cable design: a proven repeatered cable design

Qualified to 7000 m



*** Provides a barrier to hydrogen**

A design offering: Three hydrogen barriers, a welded copper tube, a vault and superior intrinsic crush protection

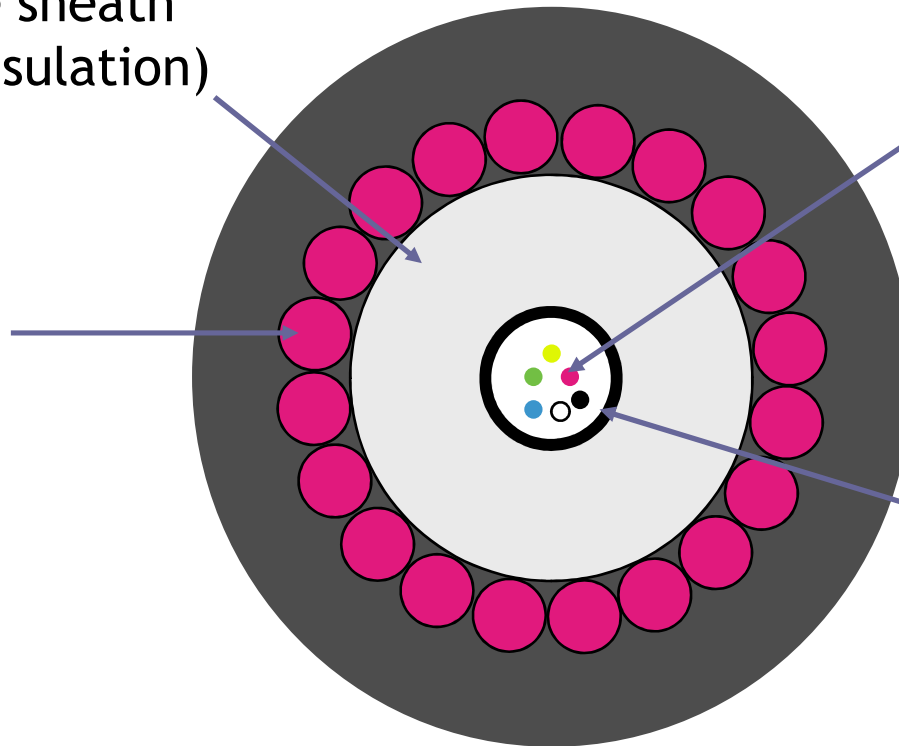
The URC-1 cable design : unrepeatered, unfitted for repeatered

Qualified to 1500 m

Polyethylene sheath
(Electrical insulation)

Optical fibres
(in special jelly*)

Steel wires
(Armor)



Steel tube*
(Mechanical protection)

* Provides a barrier to hydrogen

A design missing: a vault for deep sea application (pressure and recovery), a copper conductor, a proven insulation layer

The « Red Sky » repeater :none in service

The GMSL repeater (based on cable joint box) offers:

- No internal atmosphere control → Accelerated ageing & degraded reliability
- No hermetic housing sealing → Cable break can mean repeater replacement
- Limited thermal management → Small size impairs heat dissipation, accelerates ageing and degrades reliability
- No repeater supervisory system → Cannot locate faulty repeater/spans
- Fault Location by using external C-OTDR → Dependant on external sources, not existing in the market place today
- Limited environmental robustness → Small units more vulnerable to high shock, unproven
- Mean Time Between Failure → Unproven
- Based on a US Company design: possible embargo problems
Red Sky RED holds 41 US patents

PFE and Network Management System

GMSL is offering Spellman PFE

- Spellman is an American company headquartered in NY state, USA
- May cause Embargo enforcement issues in Cuba

Huawei Network Management System is made of different non-integrated elements

- One PFE Manager (American)
- One Huawei Manager (does not see the repeaters and the BUs)
- One expensive external source C-OTDR equipment (not sold anymore)

Alcatel Shanghai Bell

- One simple Management System overseeing all the solution elements
- In House PFE without US component

Full solution comparison over trunk line

	ASB	Huawei
Capacity <ul style="list-style-type: none">▪ 13 nm	32 λ	16 λ
Flexibility <ul style="list-style-type: none">▪ Branches▪ 16 STM-64 protected▪ Rerouting	ASB YES, BU 1 fp only YES	Huawei NO, Lack BU 2 fp required NO - Cable HV limits
Reliability <ul style="list-style-type: none">▪ Proba. 1 rep_failure/25 years	ASB 1 %	Huawei 6 %

Conclusions: ASB versus Huawei offer

Wet products **Wet plant is the cost driver (Nexans, GMSL, Red Sky)**

- URC-1: no vault, no copper tube, not suitable for 5000 m depth
- Red Sky repeater: not qualified, not proven, never deployed, US design

Solution **Reliability and maintainability are keys**

- ASB's solution 5 times more reliable - Maintainable at minimal costs
- Huawei's solution 25 year life time will be a challenge

Integration

- Huawei → Repeater factory ? Integration site ? Test Facilities ?
- ASB → Greenwich, Calais

Warranty & Long term support

- Huawei → Warranty?GMSL/R.S/ Nexans/Huawei long term relationship?
- ASB → One stop shop company

Selecting GMSL(Red Sky)/Nexans is a large technical risk for the project

The background is a deep blue with a fine, light-colored grid pattern. Overlaid on this are several bright, glowing light streaks and curved lines that create a sense of motion and depth. The overall aesthetic is clean, modern, and technological.

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