

Wet Demonstrator Background and Status Update

Brest Workshop 13 November 2017





A Brief History

- Functional Requirements First Draft July 2014
- Wet Demonstrator Scope First Draft July 2014
- Singapore Workshop Discussions Oct 2014
- General Requirements Draft to ITU Feb 2016
- Dubai Workshop Apr 2016
- Revised Design White Paper July 2016
- Revised General Requirements July 2016
- Request for Information Dec 2016

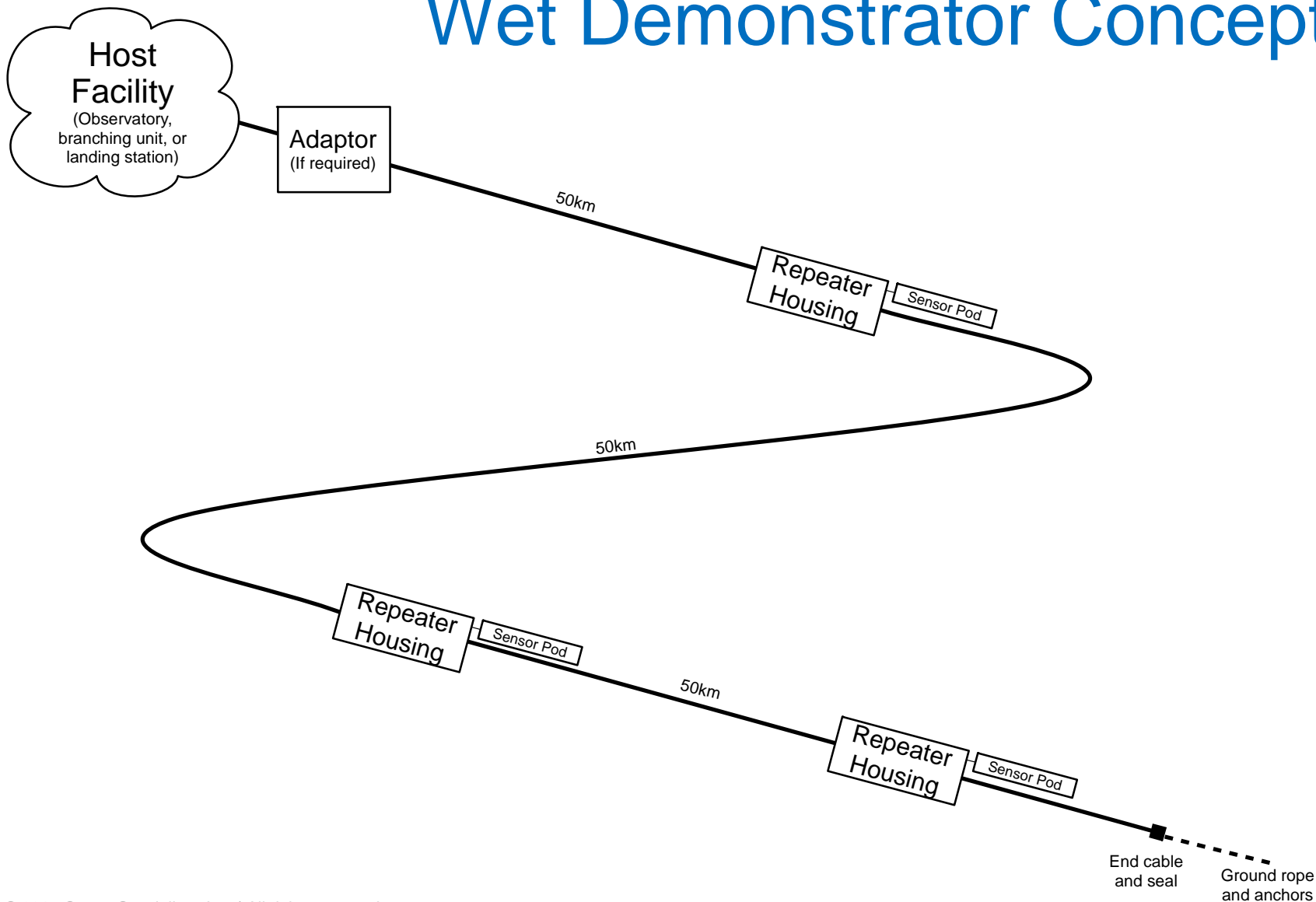


Wet Demonstrator Requirements Summary

- The Wet Demonstrator will provide a proof of concept to show that sensors attached to repeater housings can gather useful data
- The Wet Demonstrator repeaters will be a full mechanical prototype, but will use “observatory grade” power and communications
- The Wet Demonstrator will not attempt to integrate the sensors into a true telecom repeater; this is an expensive endeavor that will involve suppliers, cable system customers, and other stakeholders
- The Wet Demonstrator will show that the cost and effort of integrating sensors into a telecom repeater is justified



Wet Demonstrator Concept





Host Facility



- The wet demonstrator is largely agnostic to the choice of host facility.
- Options include:
 - An Out of Service Cable
 - An Ocean Observatory
 - An In-Service Cable
 - Any available landing point
- Basic requirements are:
 - An independent power source, 1-1.5 amp constant current
 - A communications channel: 1GBE or a pair of fibers
 - Where these are not directly available, adaptation can be used



Cable

- Any fiber optic cable can be made to work
- Ideally need 150km of LW or LWS
- Long haul cable with conductor resistance $\leq 1.6 \Omega/\text{km}$ is preferred
- Universal Joint compatibility is preferred





Repeater Housings



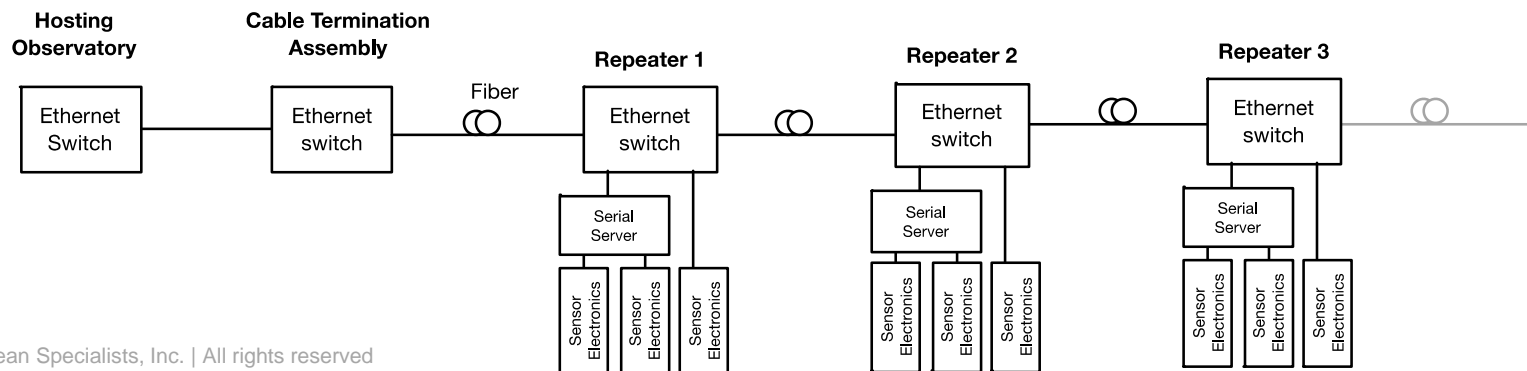
- Use of conventional repeater housing is essential to proving the premise of SMART cables: that sensors can be deployed without modifying the installation methods
- As originally conceived, repeater housings would be new, provided and integrated by one of the major system suppliers
- Due to a lukewarm response from the suppliers, repeaters recovered from an out-of-service cable should now be considered
- Repeater internal components will be replaced with power and comms components similar to those used in ocean observing systems, i.e. simple custom power boards and industrial Ethernet communications

Communications

- Industrial Ethernet devices are simple, inexpensive, reliable and effective
- For example:
 - Moxa makes a single device with 4 serial ports, 3 Ethernet ports and 2 fiber ports
 - Power consumption 935mA @ 12V
 - 100 Mb/s fiber interface
 - 29 dB link budget at 1310nm, good for 70km

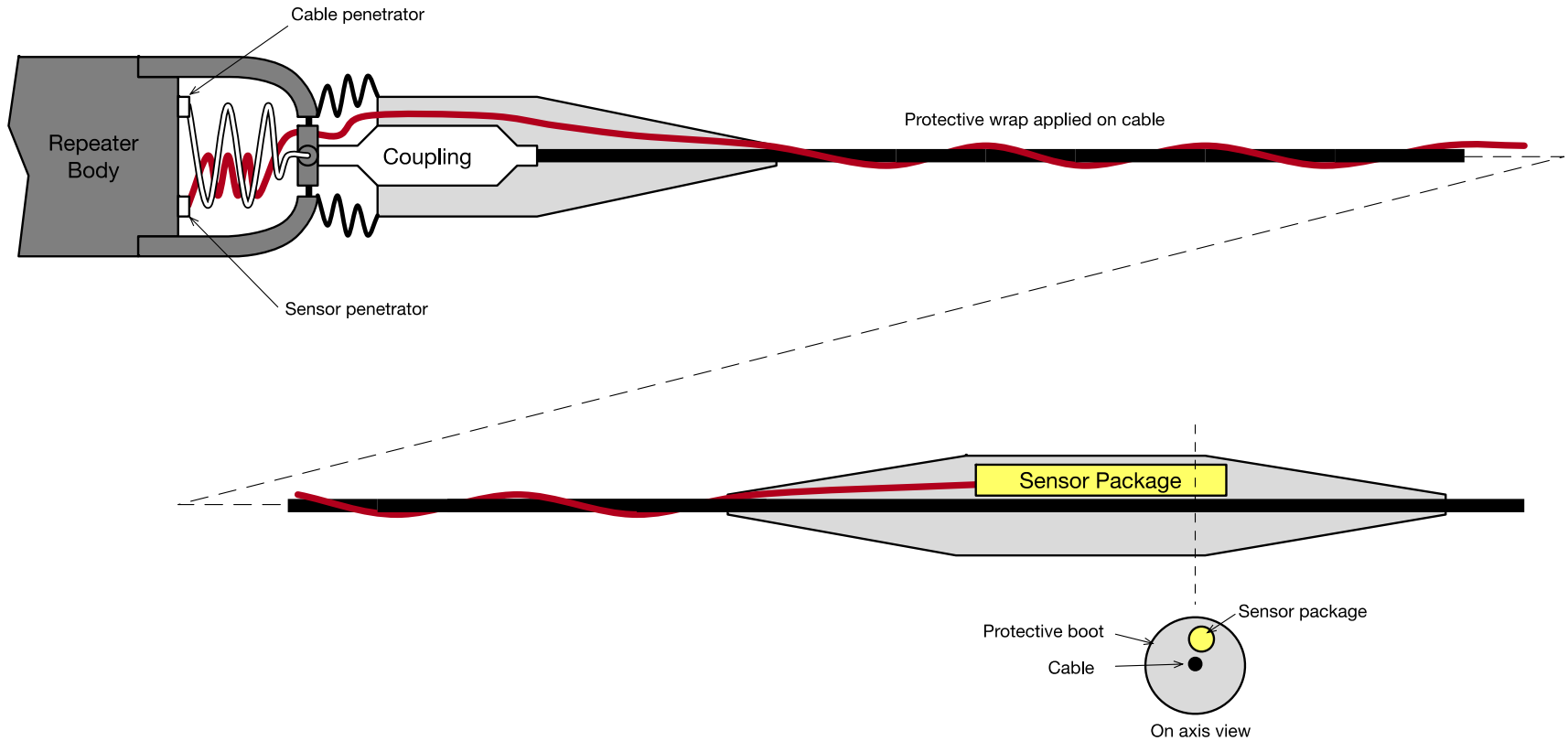


NPort S8455





Sensor Pod





Installation

- The wet test shall be laid using conventional cable lay equipment
- At least one sensor location shall be visually inspected by ROV after installation.
- The wet test cable will be laid at typical speed for repeater installation. No attempt will be made to reduce loads on the instrument housing.



Criteria for Success

- All sensors operational following installation
- 99.99% availability of sensor data over test period
- No more than one sensor of each type failing over a six month period
- Successful validation of sensor data based on agreed qualitative and quantitative criteria

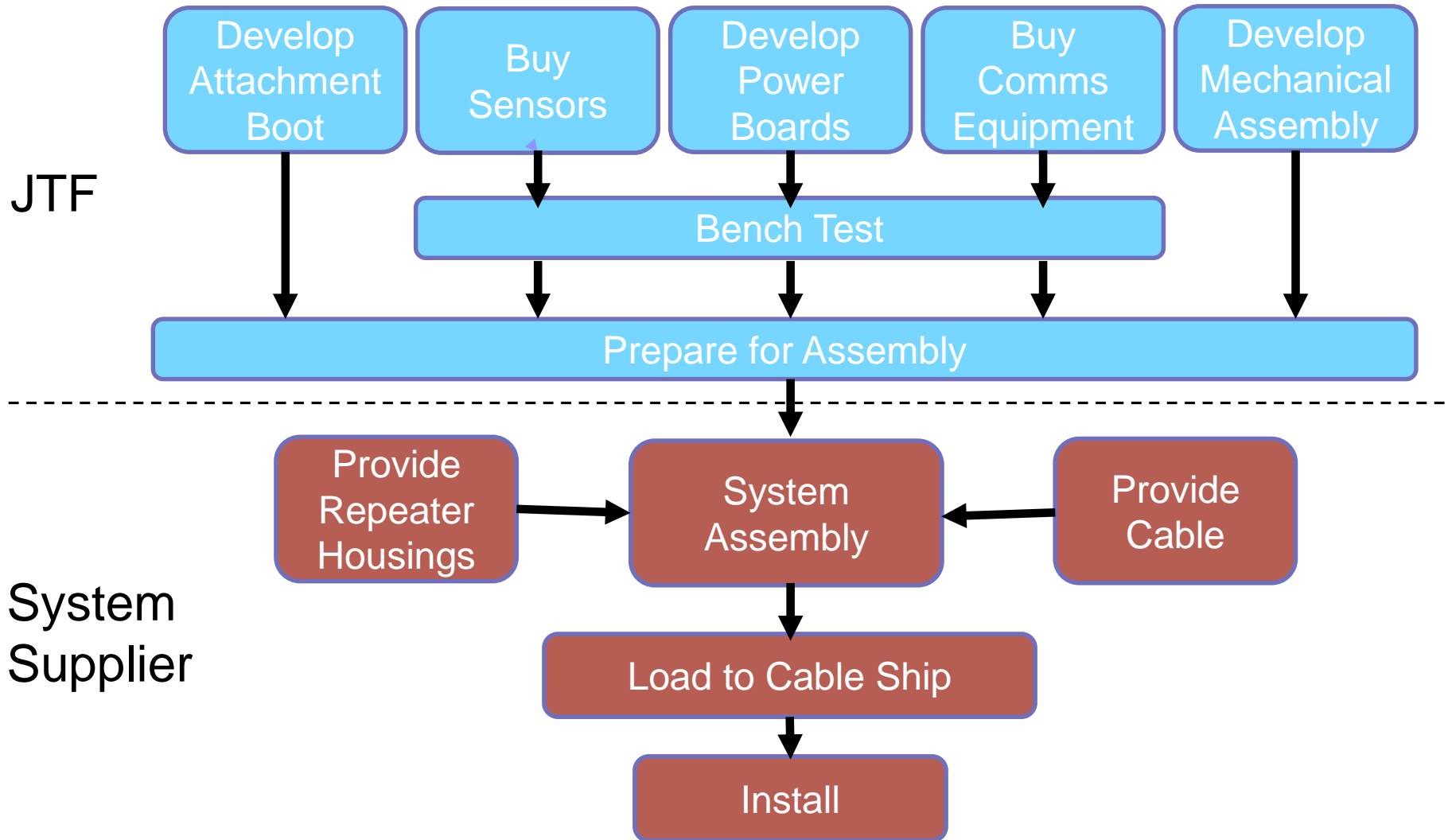


Request for Information

- Issued December 2016
- Many responses received
- Long wait for telecom system supplier responses
- Provides useful data on who can supply what
- Need to send letters to close process
- Considering new approach to Wet Demonstrator integration as illustrated on following slides

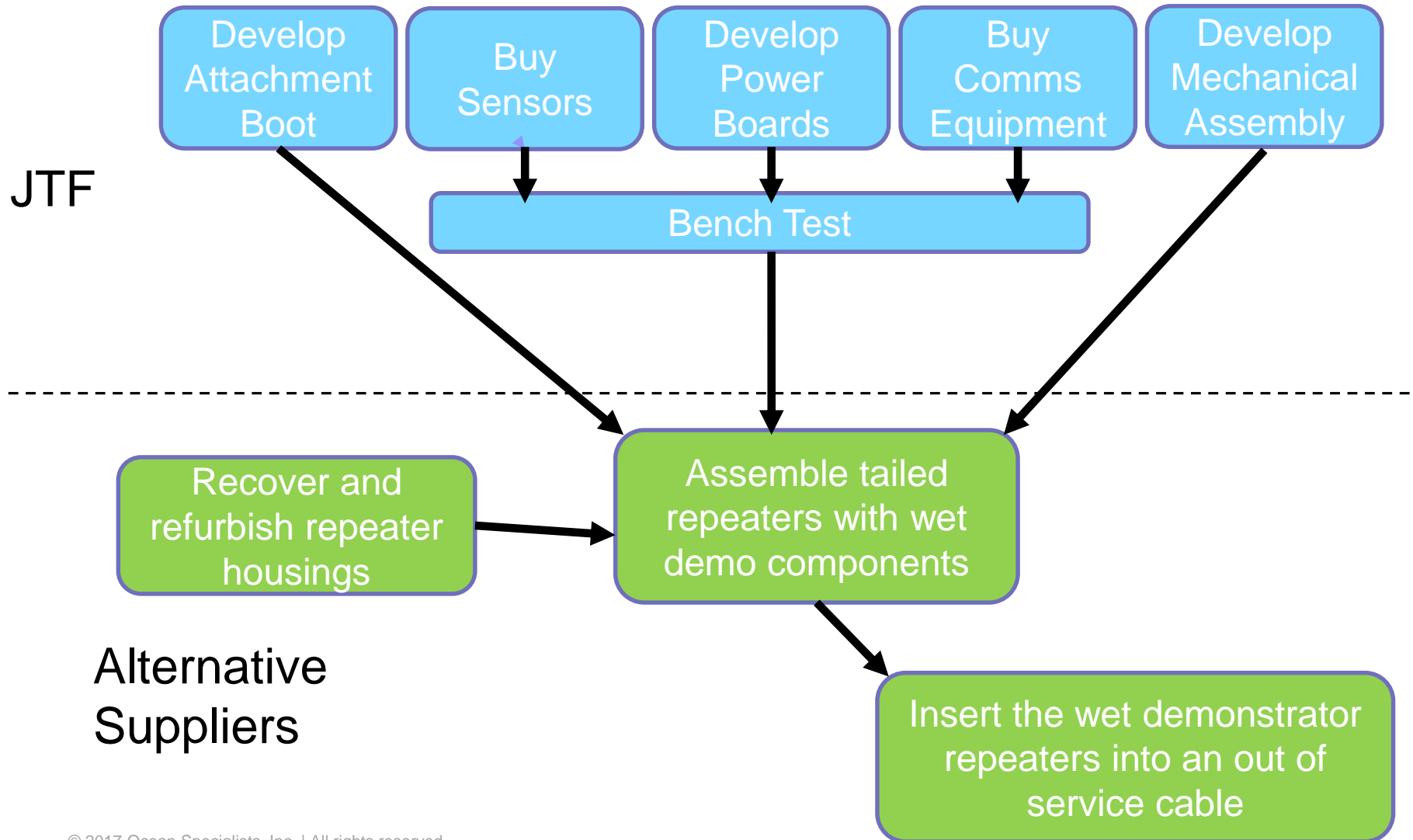


Wet Demonstrator Integration: Previous Plan





Possible New Plan





Project Needs (New Approach)

- Host Facility
- Out of service cable
- Sensors
- Repeater housings and skills to refurbish them
- Power supply design
- Ship time to insert Wet Demonstrator repeaters into the cable system



Wet Demonstrator Status Summary

- Design Objectives Established
- Still Working to Develop Budget
- Need to Follow up RFI Process to obtain cost information
- Use of Out of Service Cable to be seriously considered in light of low interest from cable system suppliers