

Wireless Communications and Data

Space Propulsion Technology
Assessment Workshop

April 2001

Current Baseline

Wireless Communications and Data

- A great deal of communications and data is currently taken across umbilicals
- Part of the process of decreasing umbilicals is transferring this traffic to wireless

Potential Solutions

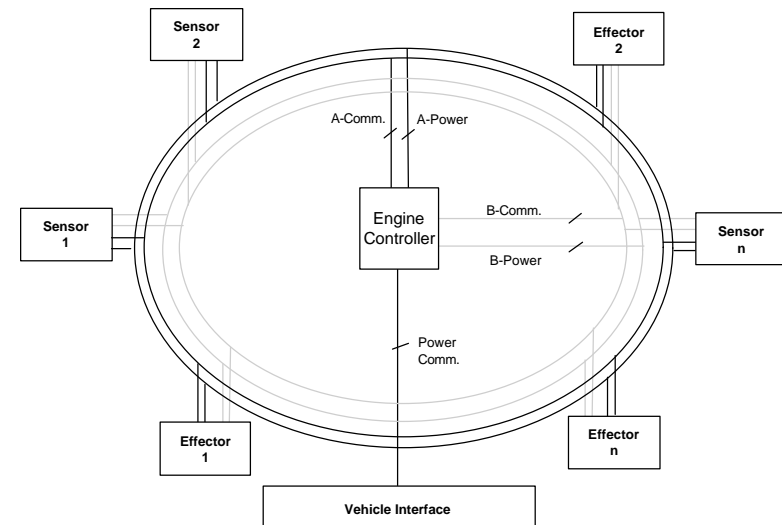
Wireless Communications and Data

- Desire is to eliminate the process verification and logistics train associated with the hard wire transfer of communications and data through umbilicals and within vehicle
- Ideally much of the data within the vehicle would also use wireless or at least ring architectures for sensors (with or without optical fiber)
 - Significant reduction in weight for wire bundles
 - Significant reduction in maintenance
 - Significant increase in reliability

SSME

Sensors	
Type	Number
Pressure	18
Temperatures	15
Speeds	3
Flow	2
Igniter Monitors	3
Position	14
Effectors	
Type	Number
Servovalve Drivers	6
Servoswitch Drivers	12
Igniters	3
Solenoids	13

- Notes:
- (1) Sensors Are Dual Output to 2 Channels Providing Full Redundancy
 - (2) 20 Harnesses Required Per Engine





Technologies to Implement Solutions (TRLs)


Wireless Communications and Data

- Use radio for communications while on the ground (4/5)
- Use radio for data transmission from vehicle to ground while on the ground (4/5)
- Use radio for transmission of data within the vehicle (4)
 - If not all wireless
 - Use of optical fibers and ring architectures for sensors could save large amount of wire bundle weight (4)
- Examine leveraging commercial standards and technology
 - E. g., Bluetooth
- Implementation must be
 - People safe
 - Power
 - Antenna placement
 - Transmission corridors
 - Equipment safe
 - Power
 - Antenna placement
 - Transmission corridors

Cost to Mature Technology

Wireless Communications and Data

\$100K	
\$500K	
\$1M	
\$5M	
\$10M	
\$30M	
\$50M	
\$100M	
\$500M	

6 Mo	
1 Yr	
18 Mo	
2 Yr	
3 Yr	
4 Yr	
5 Yr	
5 Yr+	