

Remote Data Acquisition Telemetry Options

Globalstar Simplex, Iridium SBD,
and Argos 3

Requirements and Specifications

- User Requirements
 - Project location
 - Duration of Deployment
 - Data ranges and resolution
 - Data Latency
 - Budget
 - Other
- System Specifications
 - Coverage
 - Bandwidth
 - Data Latency
 - Power Consumption
 - Cost

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Deployment/Project Location

- Important inputs
 - Number of locations
 - Land based, coastal or open ocean
 - Localized or global deployments
 - Moving or stationary

Duration of Deployment

- Open Ocean
 - Longer deployments
 - Fewer if any recoveries
- Coastal and Inland Deployments
 - Short deployments
 - Almost always recovered

Data Ranges and Resolution

- Less is better for reliability
 - Smaller packets
 - Lower cost
- Transmit lower resolution if possible
 - Store high resolution data onboard
 - Status information
- Consider limiting lat/lon range

Data Latency

- Data used in real-time
 - Compare with other instruments/measurements
 - Forecasting
 - Battery level
 - Position for recovery
- Save it for later
 - High resolution scientific data

Budget Requirements

- Hardware
 - Equipment/Batteries
- Telemetry
 - Activation/Recurring/Byte Fees
 - Inactive instruments
- Deployment/Recovery/Maintenance
 - Daily deployments
 - Turn around

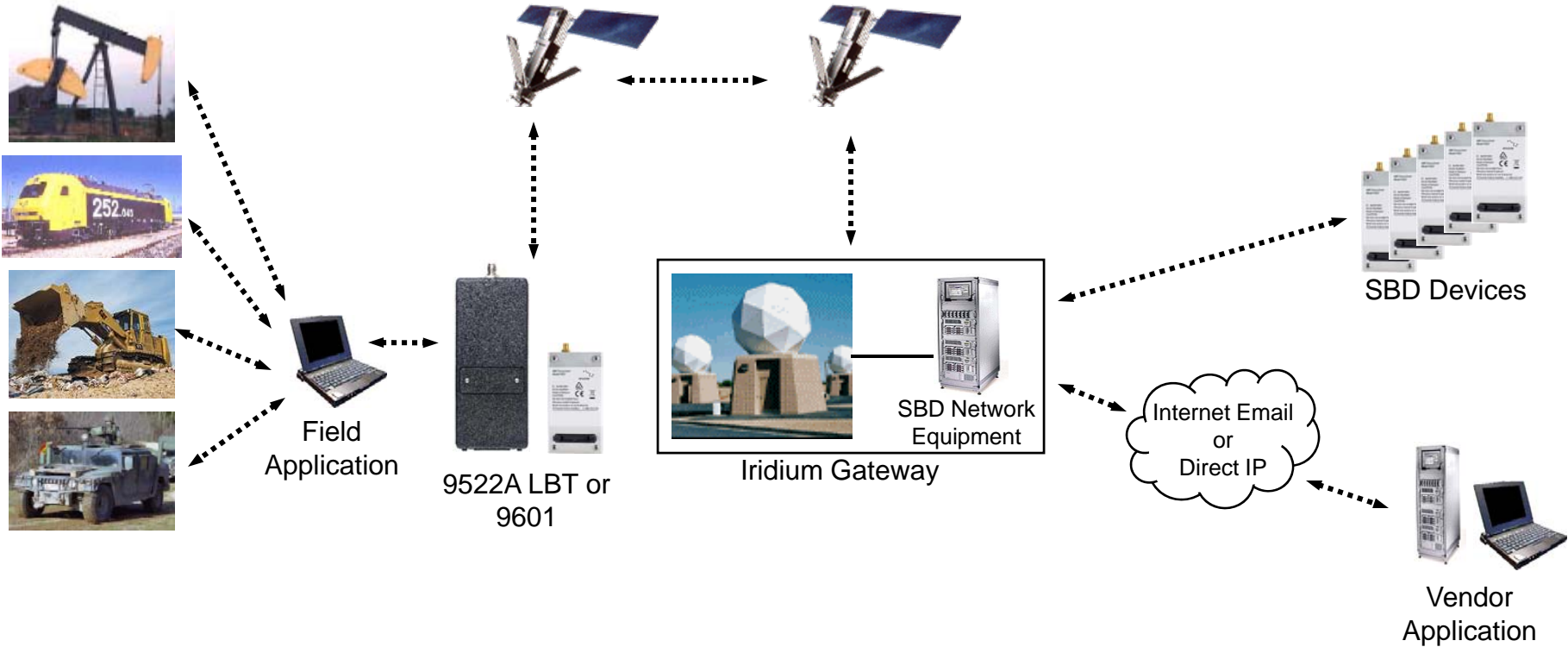
Other

- Physical dimensions of instrument
- Antenna selection
 - Type
 - Size
- Number of instruments

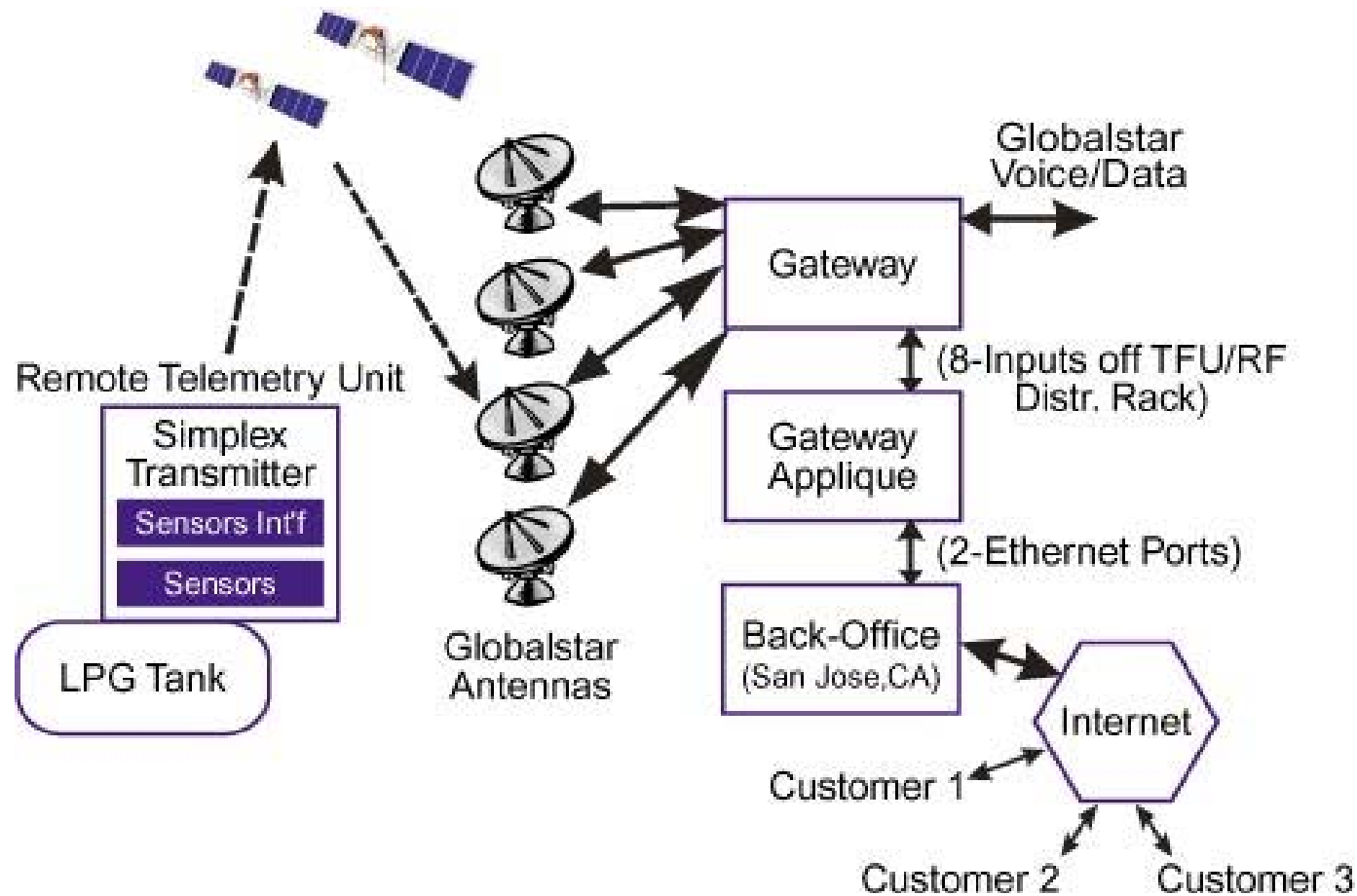
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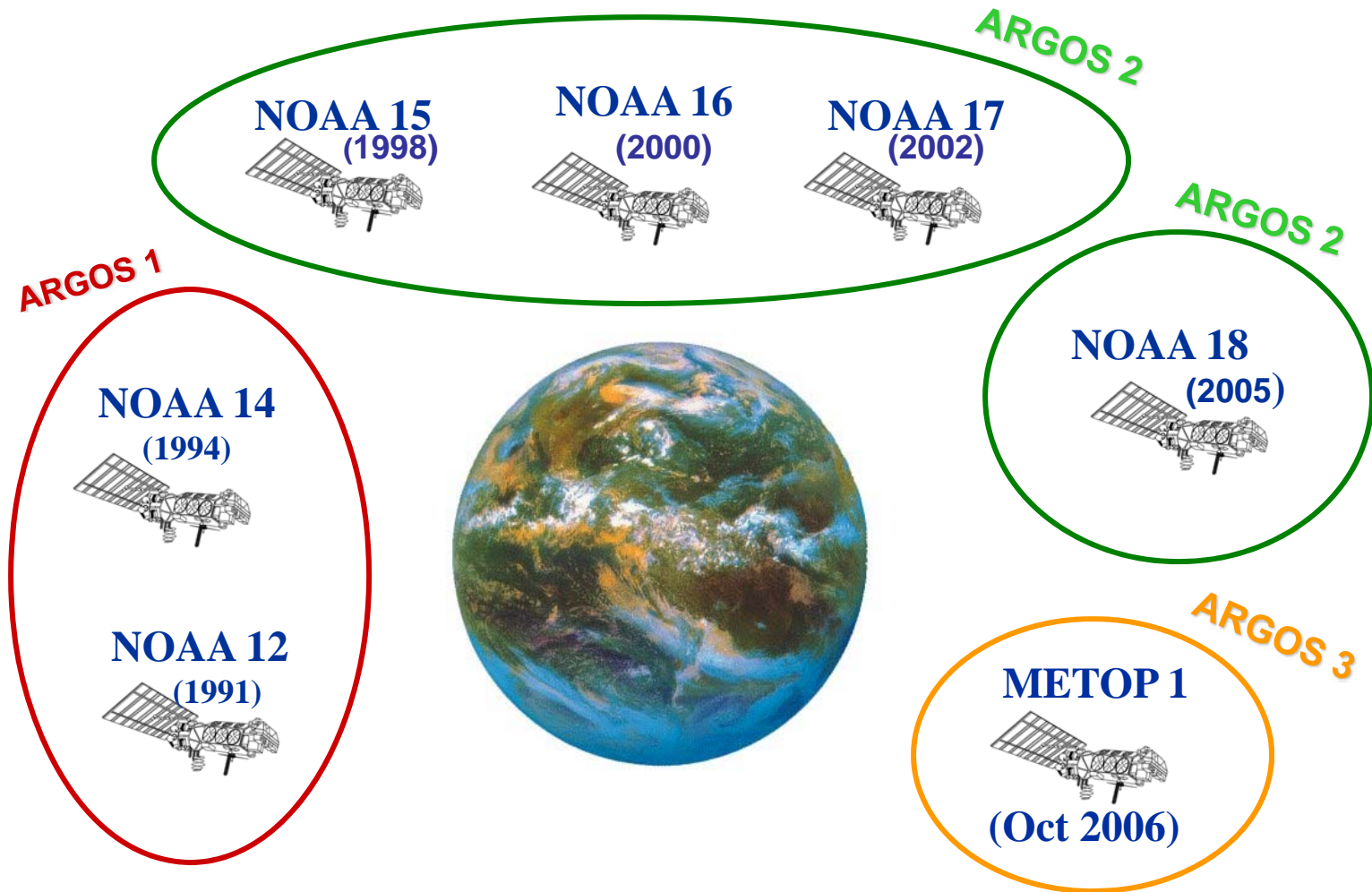
Iridium



Globalstar Simplex



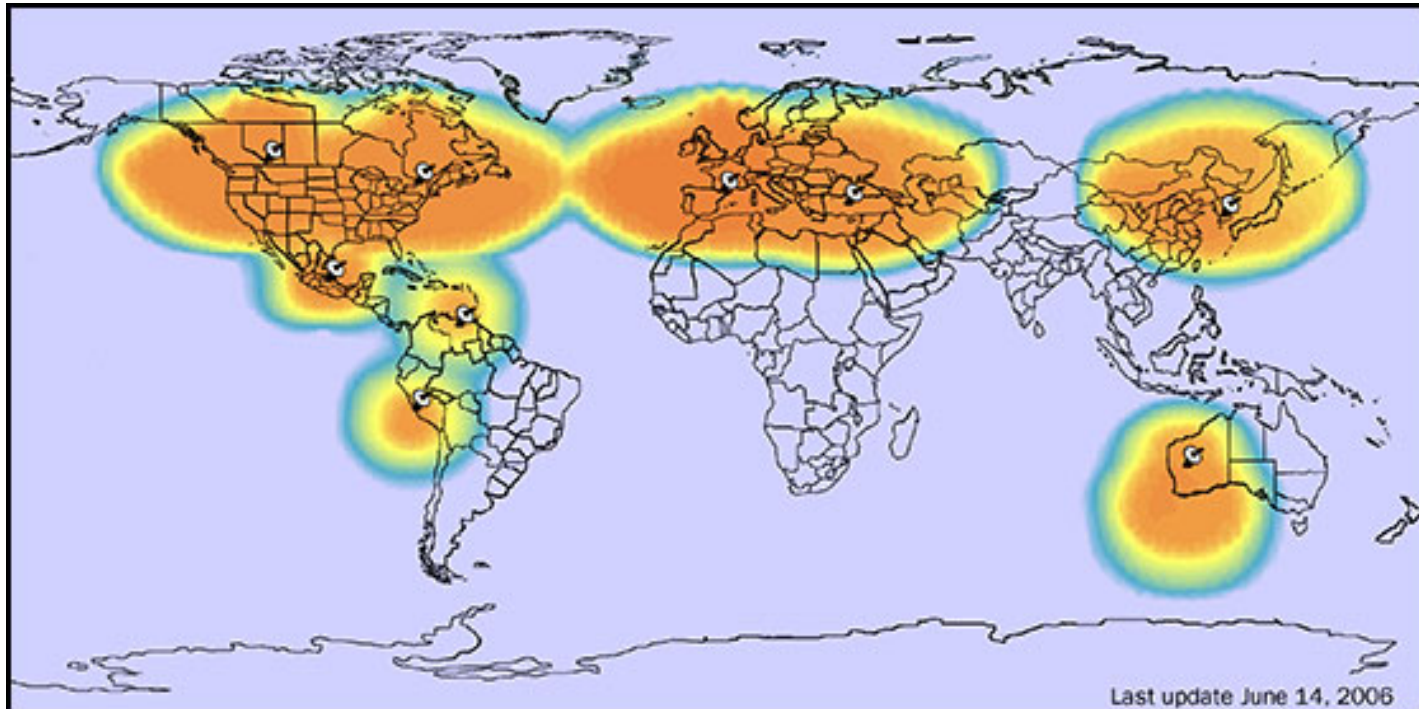
Argos



Coverage

- Iridium, and Argos
 - Global
- Globalstar
 - Bent pipe, limited coverage

Globalstar Simplex Coverage



Telemetry System Bandwidth

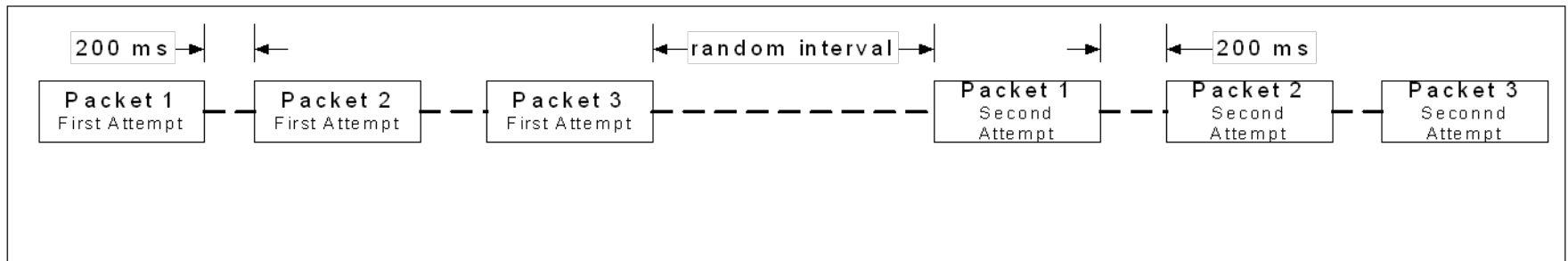
- Bandwidth (amount and rate of data)
- 1-way vs. 2-way
 - Commanding rare (power hungry)
 - 1-way w/ few satellites OK (Argos – 2)
 - 1-way w/ lots of satellites GOOD (Globalstar)
 - 2-way w/ ack. MAYBE BETTER (Argos – 3)
 - 2-way w/ ack. and lots of satellites BEST (Iridium)

Iridium SBD Bandwidth

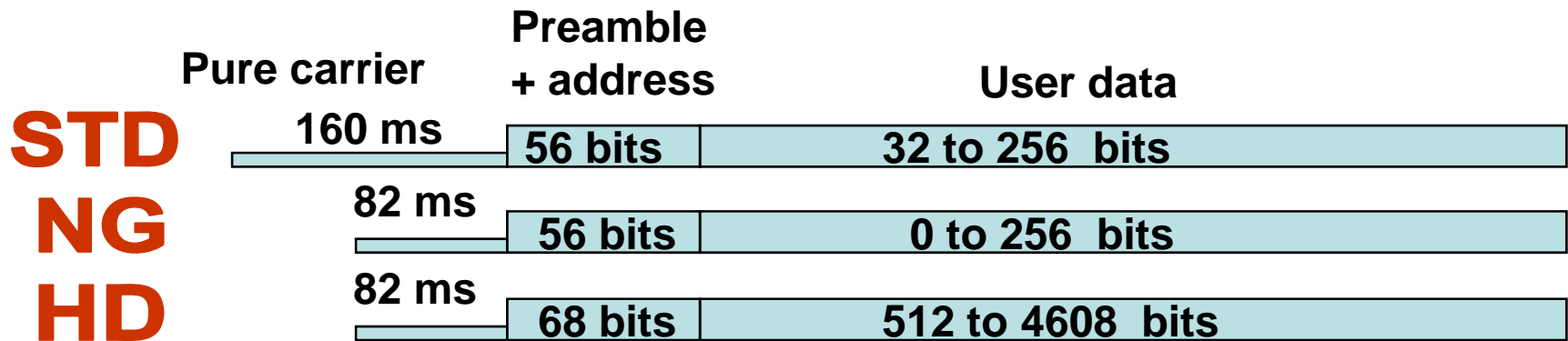
- SBD is packet-based service for frequent (approx. every 30 seconds) short data transmissions
- 9522/9522A LBT supports 1960 bytes Mobile Originated and 1890 bytes Mobile Terminated
- 9601/9612 supports 340 bytes Mobile Originated and 270 bytes Mobile Terminated

Globalstar Simplex Bandwidth

- Packet structure:
 - 72-bits for payload, 27-bits for ESN (unit ID) and 45-bits for other overhead functions
 - Transmitted at 100 bps (1.44 sec to transmit a packet)
- Packets repeated twice to enhance probability of detection
 - Each repetition 5 to 10 min apart
- Multi-packet messages possible
 - Up to 16-packets may be concatenated for total 1,152-bits of payload data.



Argos 3 Bandwidth



- Argos-2 STD, 256 bits/message, 2 message/pass, 90 second rep. rate
- Argos-3 NG, Low power, 256 bits/message, ? message/pass, ? sec rep. rate
- Argos-3 HD, 4608 bits/message, 11 messages/pass, 50 sec. rep. rate

Data Latency

- Iridium practically real time
 - Satellite to satellite eliminates latency
- Globalstar message sent every $\frac{1}{2}$ hour
 - This will improve, really, probably soon.
- Argos real-time to 2 hours
 - LUT creates bent pipe
 - Check your data w/ uplink receiver

Power Consumption

- Iridium
 - 2-way
 - Connection time high
- Globalstar
 - 1-way
 - Transmit time lowest
- Argos – 2
 - 1-way
 - No GPS
- Argos – 3
 - 2-way
 - No GPS
 - Satellite parameters

Pacific Gyre Telemetry Pricing

	Activation	Monthly	Data
Iridium	\$50	\$15.00	\$5.35/Kb
Globalstar	\$50	\$15.00	\$5.55/Kb
Argos-2*	\$0	\$13.90	\$1.85 - \$8.40/day

*Customer works directly w/ CLS

Hardware Pricing

Iridium 9601	\$450
Globalstar	\$99
Argos-2 (RF Module)	approx. \$500
Argos-3	??

Conclusions

- Iridium
 - Global Coverage
 - Real-time
- Globalstar
 - Lower Hardware Costs
 - Almost Real-time
- Argos
 - Lowest Power Consumption if no GPS
 - Includes Data Services