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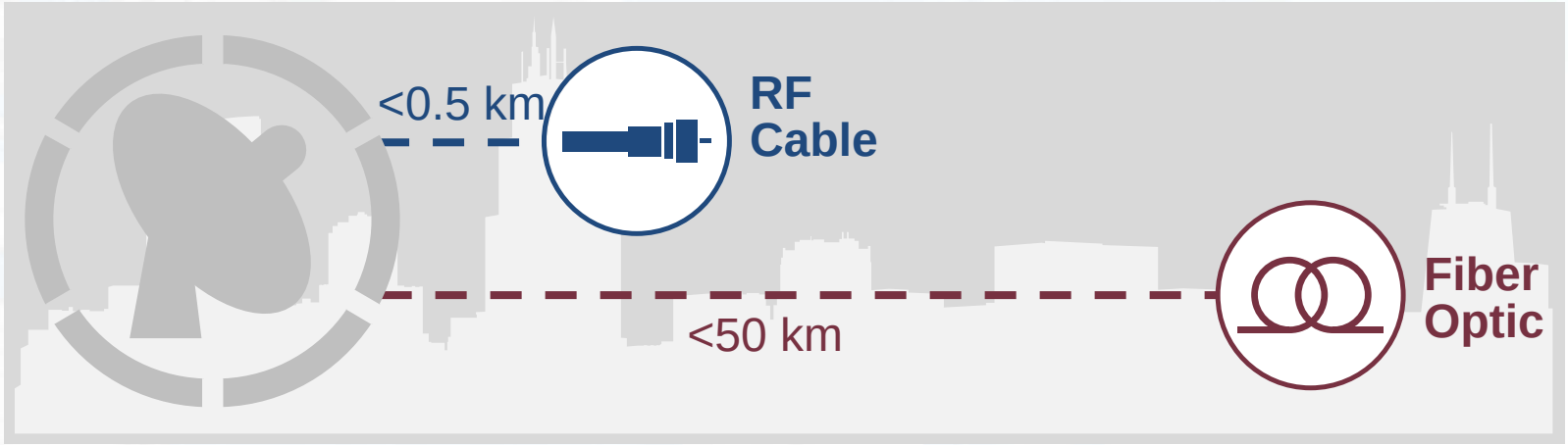
RF/IF over IP Considerations for the Range

Limitation of RF Transport



Distribution

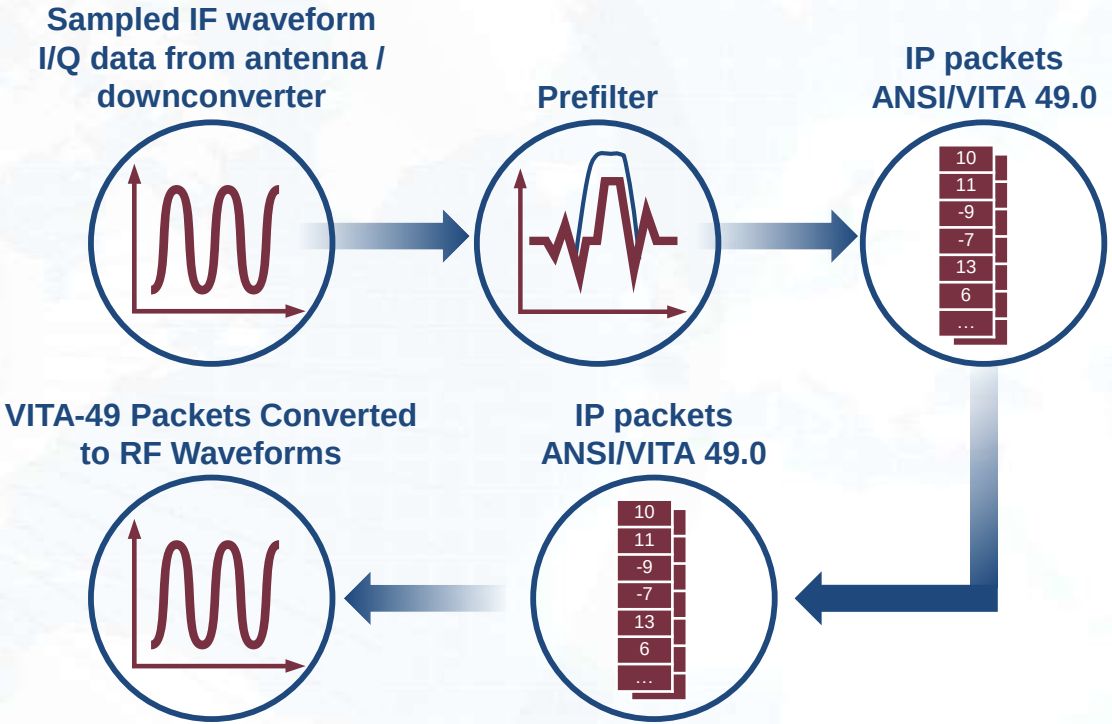
RF signals captured at an antenna can only be transmitted over a short distances before the signal degrades

Impact

Constrains ground system design by requiring processing equipment to be co-located with antennas

What is Digital IF

Enables RF Spectrum to be captured, digitized and converted into IP packets



Issues with Digital IF Adoption

1. Ability to Manage IP Transport of VITA IP Packets
2. Ability perform faithful RF reconstruction *after* transport
3. Interfacing to analog or digital equipment
4. Cost effective and deployable technology

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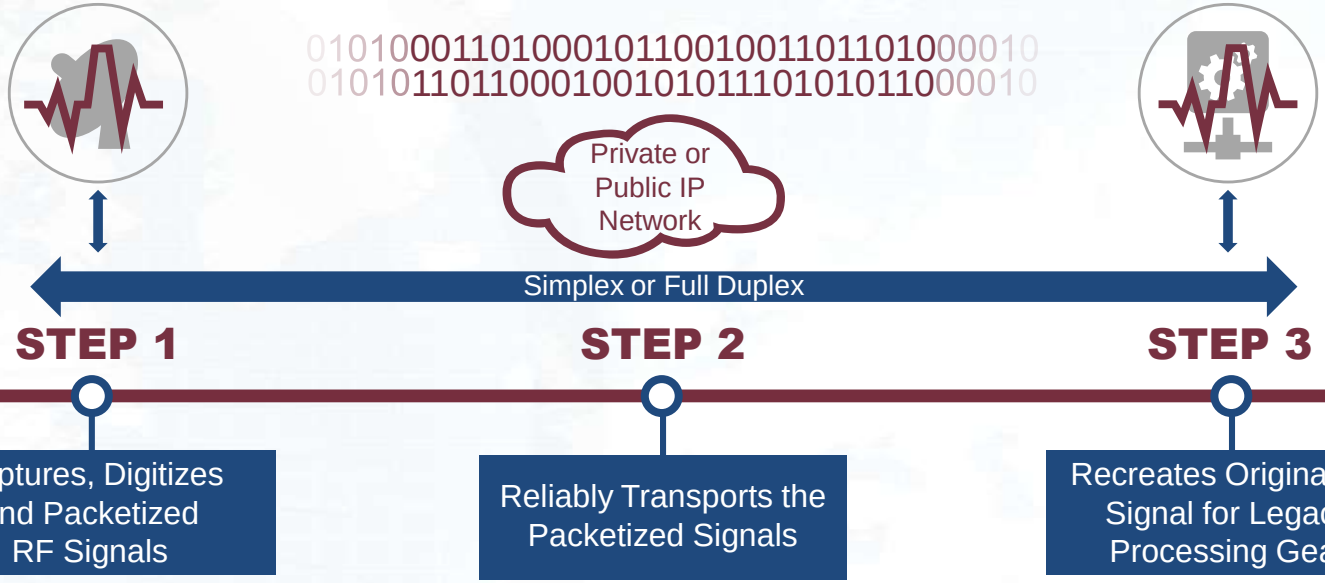
The Packetized IF Solution



Instantaneous Bandwidth Range
125 kHz up to 54 MHz

Input/Output Tuning Range
950-2150 MHz

- Deterministic Latency and Jitter Control
- Lossless Transport
- Faithful analog reconstruction
- Precision Signal Alignment

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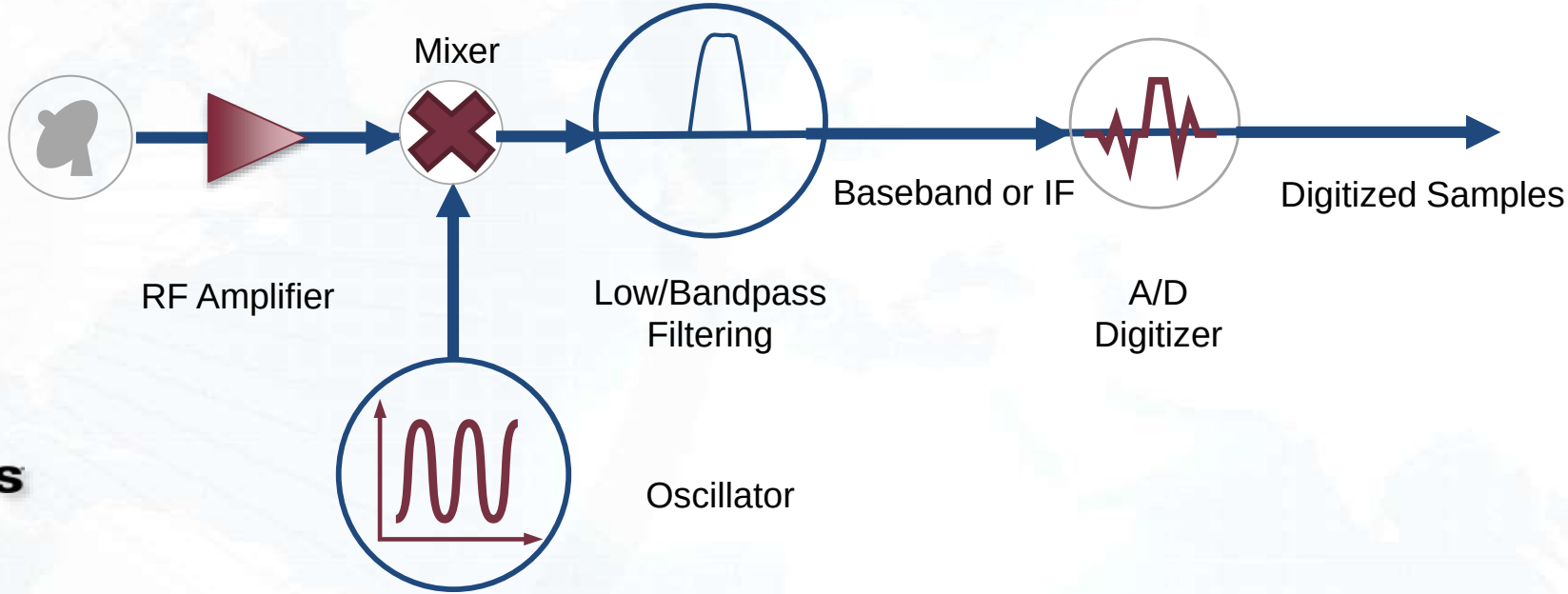
Assuring Performance ***. . . from the Ground Up***

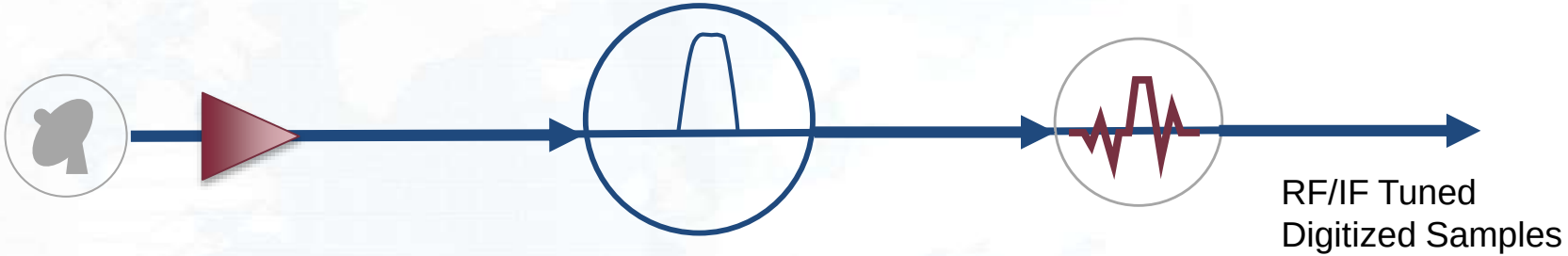
Traditional A/D Translation

Analog Translation to Baseband/IF



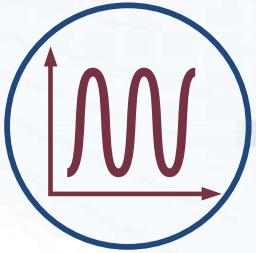
Direct A/D Translation

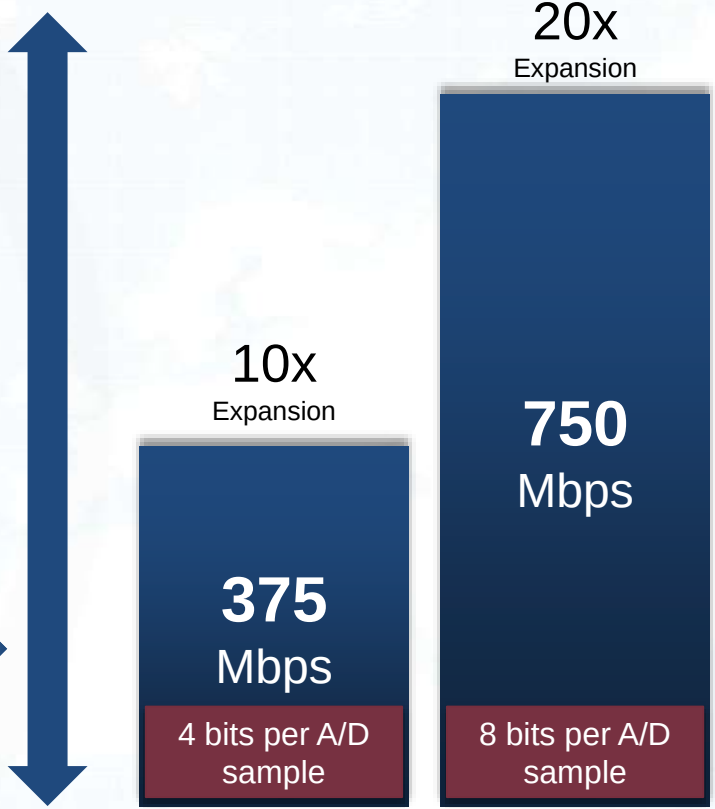
Direct Sampling and Digital Tuning to RF or IF



Bandwidth Consumption and Management

RF over IP does require sufficient IP bandwidth to support transport

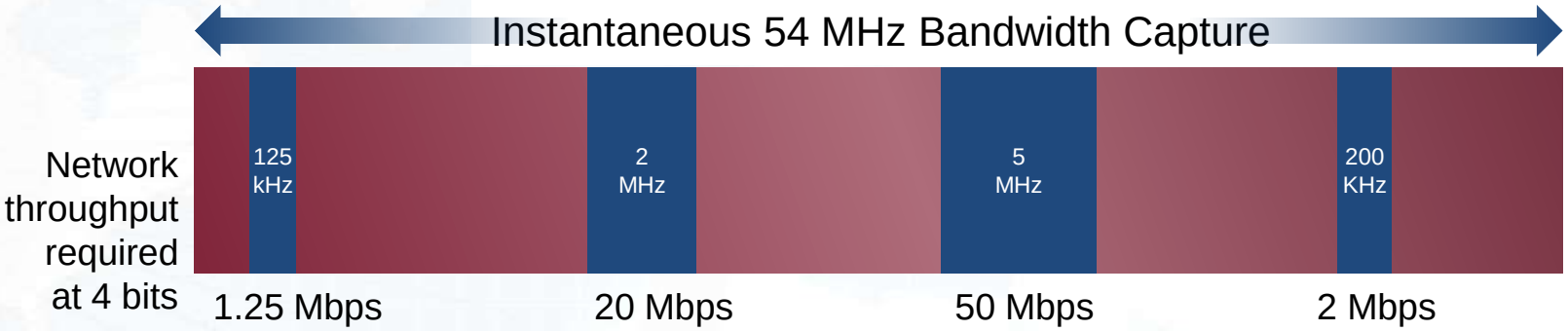




Bandwidth Consumption and Management

Spectral Channels

Ability to select the bandwidth of interest from the instantaneously captured BW



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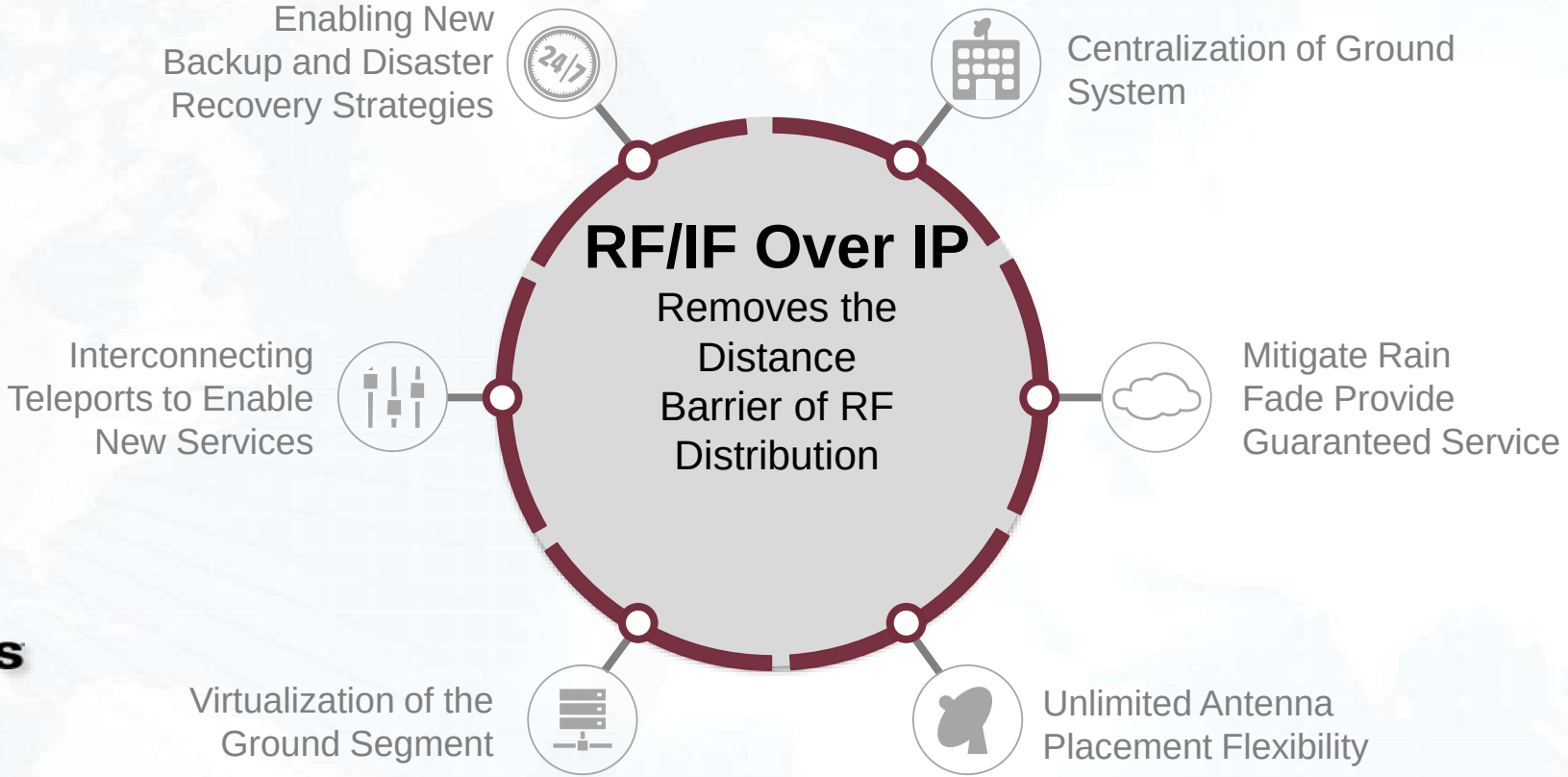
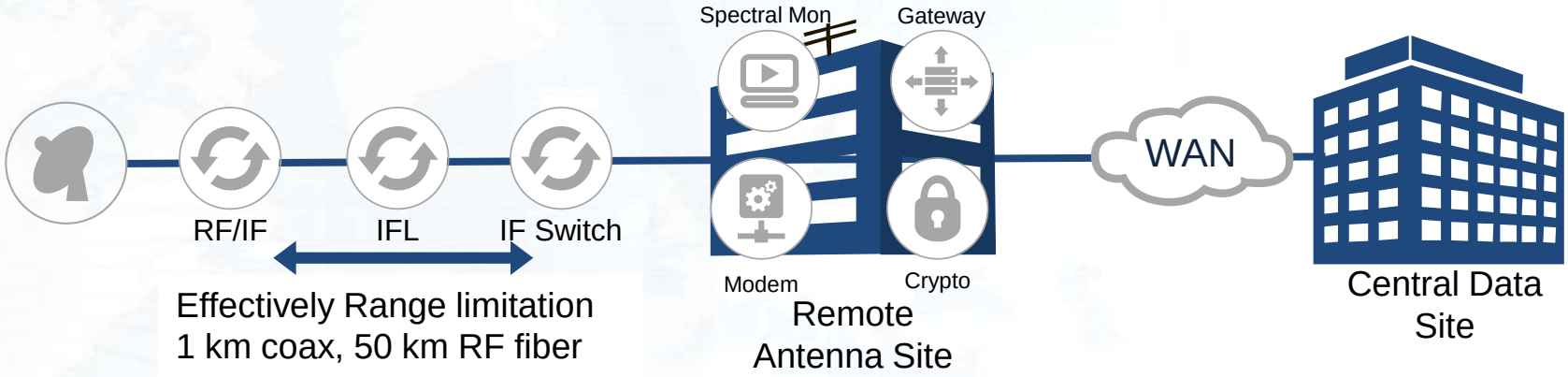
Packetized IF Use Cases



Centralization of Ground System Operations

Today:

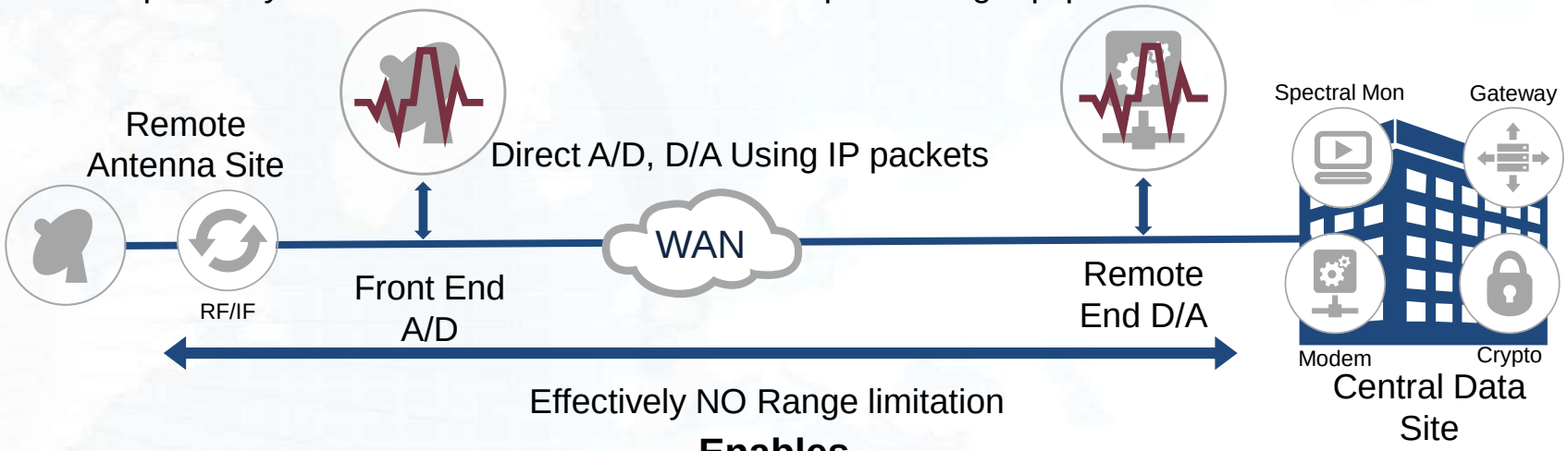
Equipment must located in close proximity to antennas due to RF/IF signal attenuation



Centralization of Ground System Operations

With RF/IF over IP:

The proximity constraints between antennas and processing equipment is eliminated



Enables

1. Equipment Pooling
2. Centralized operations
3. Reducing space and power footprint
4. Better use of personnel

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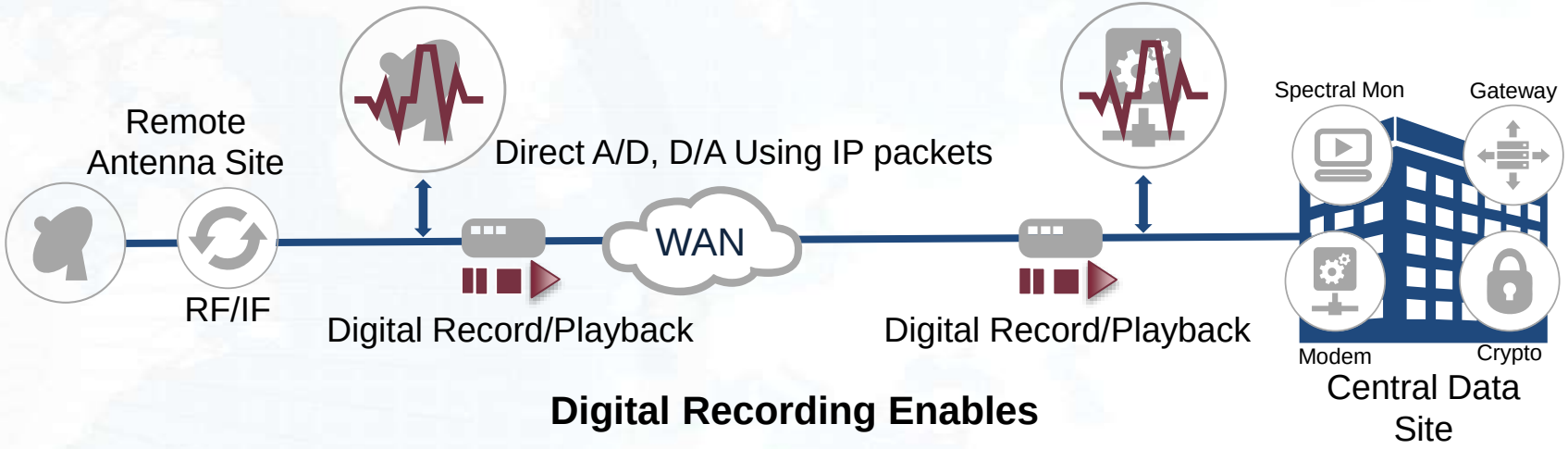
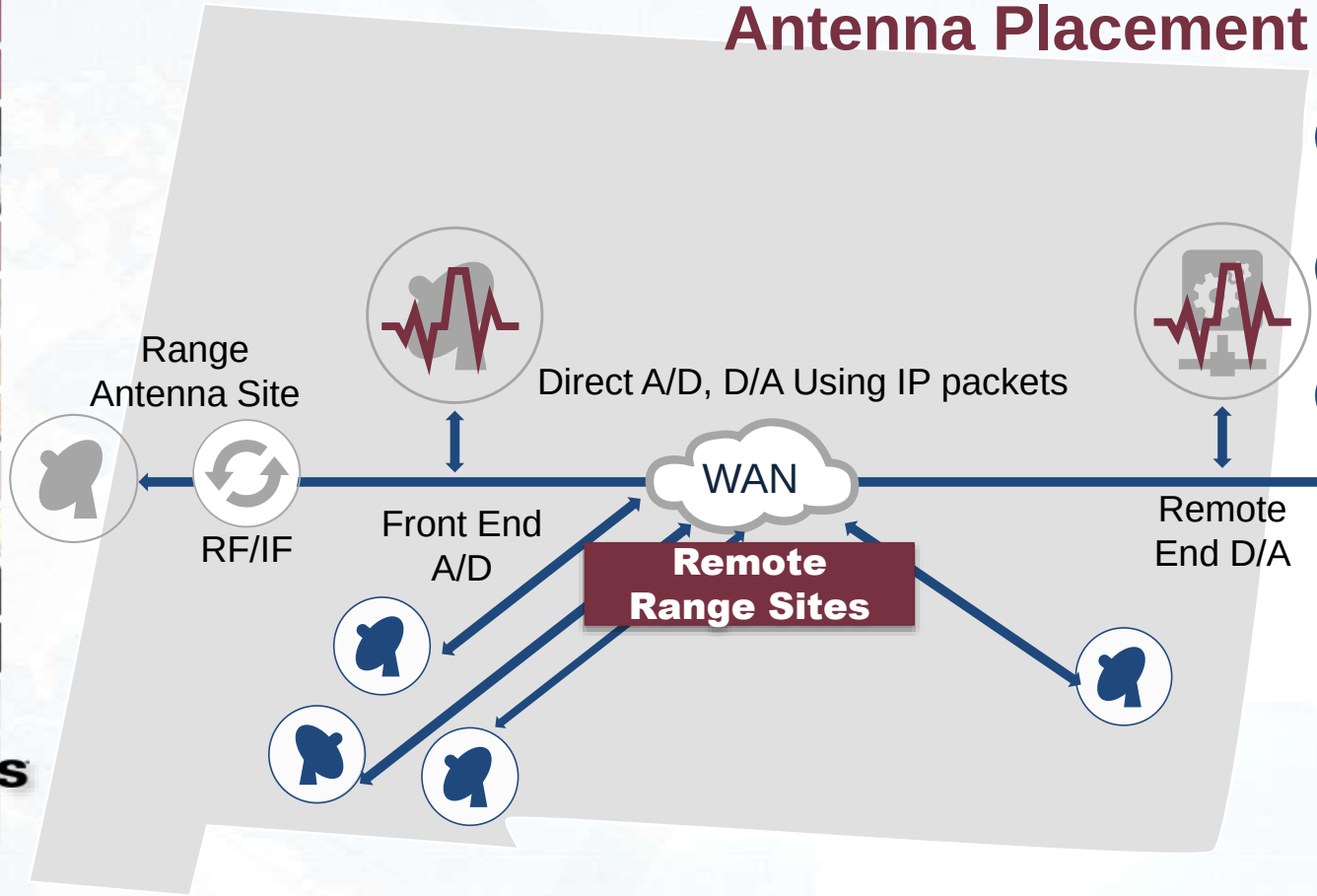
Centralization of Ground System Operations



Digital Recording Enables

1. Recorded contact data used in anomaly resolution
2. Data retrieval for analysis
3. Playback used in training environment
4. Archival/history collection

Antenna Placement Flexibility



1. Dynamic support for tactical environments
2. Optimize signal reception
3. Simplify disaster recovery planning

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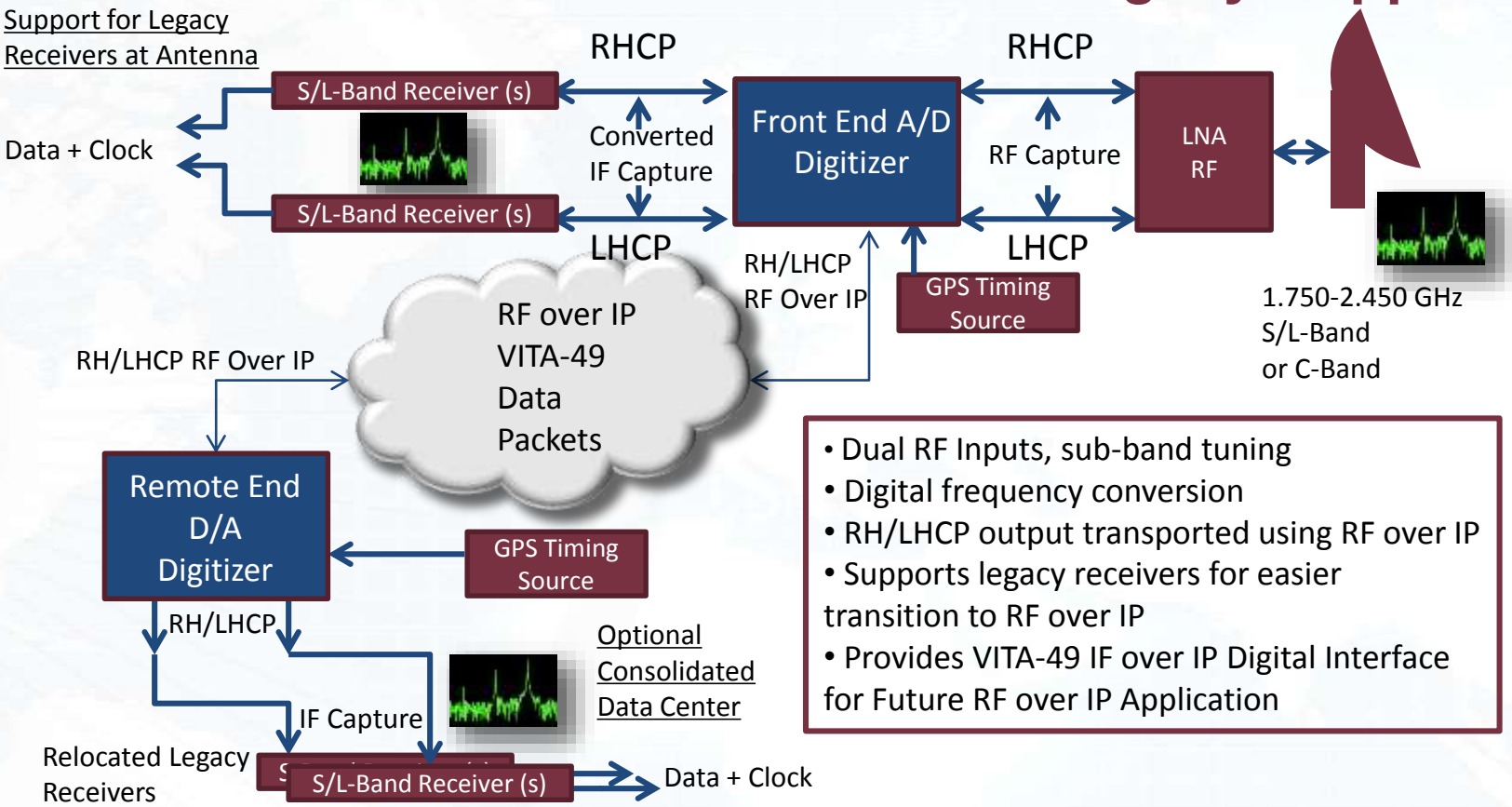
RF over IP Legacy Support



- Dual RF Inputs, sub-band tuning
- Digital frequency conversion
- RH/LHCP output transported using RF over IP
- Supports legacy receivers for easier transition to RF over IP
- Provides VITA-49 IF over IP Digital Interface for Future RF over IP Application

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RF over IP Combiner Range Application

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Data + Clock

S/L-Band Receiver

Remote End D/A Digitizer

GPS Timing Source

Additional Networked Site(s)

Combined RF Over IP

Front End A/D Digitizer

Digital Recording/Playback

Diversity Combiner

AM Tracking Receiver

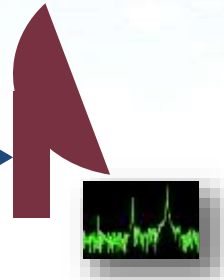
RHCP

RF Capture

LHCP

LNA RF

To ACU



1.750-2.450 GHz S/L-Band or C-Band

Combined RF Over IP

GPS Timing Source

RF over IP VITA-49 Data Packets

Combined RF Over IP

All Digital VITA-49 Range Receiver (s)

Data + Clock

Remote End D/A Digitizer

Digital Recording/Playback

GPS Timing Source

Single, Combined Output

Data + Clock

Consolidated Data Center

Relocated Legacy Receivers

S/L-Band Receiver

- Dual RF Inputs, sub-band tuning
- Digital frequency conversion
- Pre-Detect combined output transported using RF over IP
- Adds combiner, AM tracking, and digital recording to reduce antenna hardware
- Supports legacy receivers for easier transition to RF over IP
- Provides VITA-49 IF over IP Digital Interface for all digital receivers