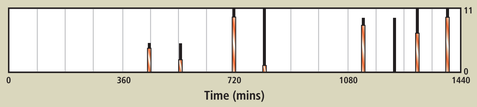
National Polar-orbiting Operational Environmental Satellite System (NPOESS)

Field Terminal Segment

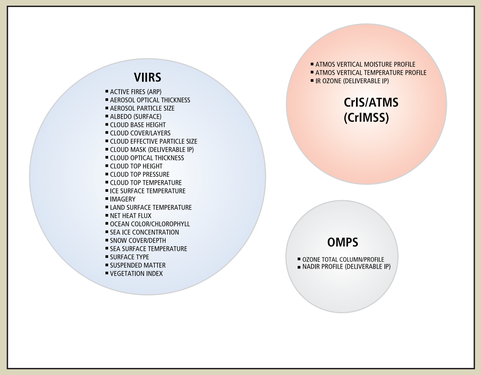
Field Terminal Concept

Typical Received Contacts – Omaha FT (41N 96W), One Day

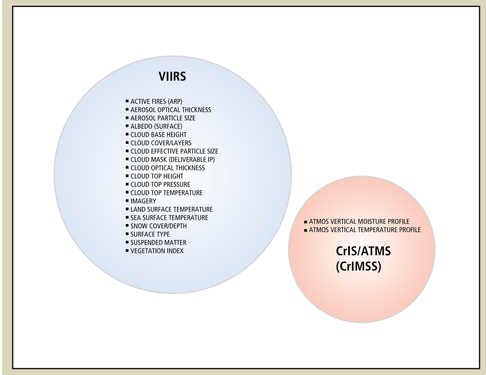
Typical Contacts for Constellation of NPOESS Spacecraft
Field Terminal Location: Omaha



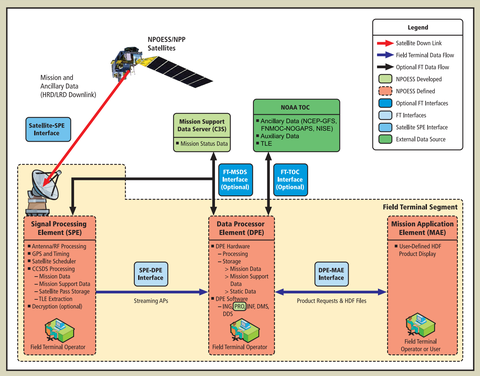
HRD EDR-to-Sensor Mapping



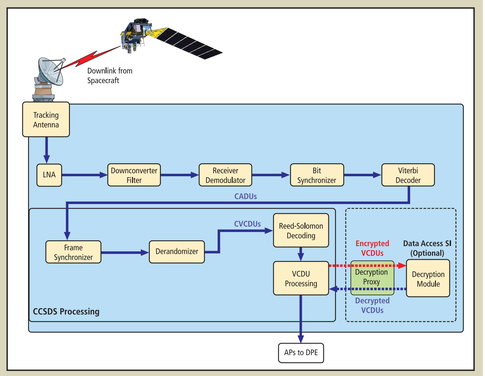
LRD EDR-to-Sensor Mapping



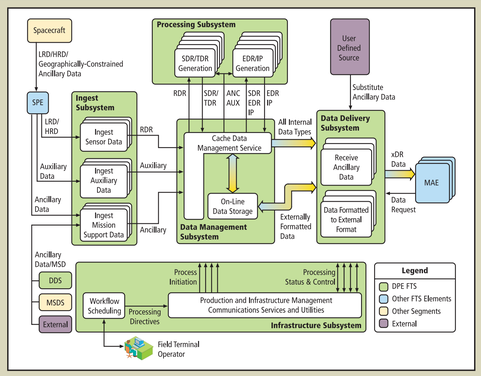
FTS Architecture



FTS Subsystems – SPE



FTS Subsystems – DPE



Satellite Contacts – NPOESS (1330, 1730)

Latitude (degrees N/S)	Total Contacts (17 day period)	Average Contacts (per day)	Maximum Contact Duration (minutes)
0	128	7.57	12.89
10	130	7.65	12.90
20	136	8.00	12.92
30	150	8.86	12.95
40	173	10.19	12.99
50	217	12.79	13.03
60	334	19.69	13.07
70	376	22.12	13.10
80	483	28.43	13.12
90	482	28.39	12.37

FTS SPE 24 Hour Storage Estimates (GB)
Constellation of 2 NPOESS Satellites (1330, 1730)

Latitude (degrees N/S)	HRD	LRD
0	29.07	5.64
10	29.35	5.69
20	30.70	5.96
30	34.00	6.60
40	39.12	7.59
50	49.07	9.52
60	75.56	14.66
70	84.89	16.47
80	109.12	21.17
90	108.97	21.14

FTS DPE 24 Hour Storage Estimates (GB)
Constellation of 2 NPOESS Satellites (1330, 1730)

Latitude (degrees N/S)	HRD	LRD
0	418.71	413.56
10	422.76	417.56
20	442.30	436.86
30	489.85	483.82
40	563.56	556.63
50	706.94	698.24
60	1088.42	1075.03
70	1222.95	1207.91
80	1572.00	1552.66
90	1569.79	1550.48

FTS DPE Predicted Processing Requirements

Constellation of 2 NPOESS Satellites (1330, 1730)
2.6 GHz Processors, Split VIIRS SDR Architecture (16-scan VIIRS Granules)
11/15/2007 Results

HRD		LRD	
Processors	Maximum EDR Latency (Minutes)	Processors	Maximum EDR Latency (Minutes)
12	12.27	10	14.92

FTS DPE Memory Requirements

Constellation of 2 NPOESS Satellites (1330, 1730)
16-Scan VIIRS Granules
11/30/2007 Results

	HRD	LRD
Memory (GB)	36.51	33.48
Disk I/O (MBps)	411.52	425.57

Link Characteristics

Link Parameter	HRD	LRD
Channel Data Rate	40 Mbps	7.76 Mbps
Modulation with bit interleaving	SQPSK with square root raised cosine pulse shaping [alpha = 0.5]	SQPSK with square root raised cosine pulse shaping (alpha = 0.5)
Coding	(255, 223) Reed-Solomon with I=4	(255, 223) Reed-Solomon with I=4
Convolutional Encoding: Code Rate Constraint Length Connection Vectors Phase relationship Symbol inversion Number of encoders Branch Encoder Sent to I Modulator Sent to Q Modulator	 ½ 7 bits G1=1111001, G2=1011011 G1 associated with first symbol On output path of G2 1 No G1 Symbol inverted G2	 ½ 7 bits G1=1111001, G2=1011011 G1 associated with first symbol On output path of G2 1 No G1 Symbol inverted G2
Randomization	$h(x) = x^8 + x^7 + x^5 + x^3 + 1$	$h(x) = x^8 + x^7 + x^5 + x^3 + 1$
Maximum Occupied Bandwidth (98% power)	30.8 MHz	6.0 MHz
BER after decoding	$< 10^{-8}$	$< 10^{-8}$
Carrier Frequency	7834MHz	1707.0 MHz
Polarization	RHCP	RHCP
Minimum elevation angle	5.0 degrees	5.0 degrees
Orbit-averaged availability	99.6%	99.9%
Data Format	NRZ-M (Prior to Convolutional encoder)	NRZ-M (prior to Convolutional encoder)

Assistance in the Development of NPOESS Field Terminals

The following documents are being developed under the NPOESS contract for free distribution to field terminal equipment vendors around the world:

- The minimum specifications required for these terminals will be documented in the Field Terminal Technical Specification
- All necessary external interfaces will be documented in the Field Terminal Interface Control Document

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NORTHROP GRUMMAN

Raytheon

Customer Success Is Our Mission