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November 4, 2004

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Federal Communications Commission
Office of Secretary

Marlene Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
12th Street Lobby, TW-A325
Washington, DC 20554

RE: Celsat America, Inc.
<u>SAT-MOD-20040717-00134</u>

Dear Ms. Dortch:

Enclosed on behalf of Celsat America, Inc. ("Celsat"), please find the two most recent monthly progress reports issued by Space Systems/Loral, Inc. ("Loral") in accordance with the satellite manufacturing contract pursuant to which Loral is building Celsat's satellite. This submission responds to a letter dated October 27, 2004 to the undersigned counsel from Fern Jarmulnek, Deputy Chief of the Satellite Division of the Commission's International Bureau.

Please contact the undersigned should you have any questions concerning this submission.

Sincerely,

Brian D. Weimer
Counsel to Celsat

Enclosures

cc: Fern Jarmulnek
Alyssa Roberts

522459-D.C. Server 2A - MSW

Celsat Monthly Progress Report
For
September 12, 2004

a. Major Program Events:

- Contract amended 7/12/04 for new satellite design.
- Finalized amendment to contract documents. Documents approved and signed:
  - Amendment 1 to Celsat Contract
  - Exhibit A, Statement of Work
  - Exhibit B, Spacecraft Performance Specification
  - Exhibit C, Product Assurance Plan
  - Exhibit D, Satellite Program Test Plan
- Supported Celsat submission of FCC Form 312. Performed initial satellite budget and performance predictions to support filing. Included antenna analyses, payload design, bus configuration and sizing, and TT&C link analysis.
- Established Program Management Office for the Celsat program. Provides Celsat customer interface and internal company direction.
- Completed price validation exercise.
- Allocated 32,000 Si solar cells from inventory for use on Celsat solar arrays as part of start of construction activities. Cells are stored in Japan at manufacturer and will be available for solar array construction
- Initial assessment of facilities and factory processes for Celsat started. The Celsat satellite is expected to present no difficulties for production handling and test as it is very similar to other programs completed by SS/L.
- SS/L is ISO 9001 certified. Standard quality plans and procedures are approved for all programs. A review of the applicability of these standard plans and procedures has been initiated.
- Performance budgets and qualification status list are in development. Detailed results and compliance matrix are to be available at CDR per the contract.

b. Technical Status:

1. Spacecraft – See attached description for current design status summary.
   - Preliminary mass, power, thermal, propellant analyses completed. Results show spacecraft is within normal design limits for satellite and launch vehicles.
   - Preliminary propellant analyses show positive mass margin to current budget.
   - Spacecraft will fit in 4m fairing compatible launch vehicle.
   - Working with 2 antenna suppliers for define initial stowage and deployment interface requirements.
   - Spacecraft will fly 20-30 degrees off earth-pointing normal to obtain FOV and optimum antenna configuration.

2. Payload – The payload detailed design is underway.
   - Payload uses 12m unfurlable antenna with 48 element array for CONUS and AK coverage. Separate subarrays provide HI and PR/USVI coverage. Finalization of array

SPACE SYSTEMS LORAL

size based on coverage area, performance, repeater equipment factor, and configuration. 46 elements are used for transmit and 48 elements are used for receive.

- Discussions with antenna suppliers started.
- Repeater uses S-band TWTA with DRC. This allows improved dc and thermal efficiency for same rf power. Penalty in mass and size versus previous SSPAs.
- Repeater channelizes to full 20MHz MSS band to support ground-based beamforming architecture using analog S-band channel filters. Gateways determine segmentation of the band for users. Single conversion between Ka and S-band simplifies repeater design. Modified versions of existing repeater units (filters, converters, amplifiers) are used to minimize NRE and achieve best schedule.
- Developed generalized calibration and pointing coefficient methodology to support ground-base beamforming. Beamforming coefficients for each antenna feed element generated at gateways. "Quasi-user" terminals monitor satellite transmissions and uplink test signals to provide calibration information for coefficient compensation.
- Detailed repeater equipment list being refined. Discussions with suppliers started.
- S-band antenna peformance trades between G/T, EIRP and C/I started. Optimizations for various scenarios of frequency reuse for capacity in process. Frequency reuse for K = 3 thru 12 being evaluated.

3. Bus – The bus detailed design is underway.
   - Bus structure chosen similar to iPStar program currently under construction. Enables reduced NRE while providing flexibility for payload equipment accommodation.
   - Initial layout and configuration studies started. Optimizing comm panel layout for payload performance.
   - Eliminated deployable radiatiors by use of TWTA with DRC which reduced thermal demand to spacecraft significantly.
   - Evaluating ADCS and propulsion to support "canted" angle orientation of platform. Trades of wheel size and thruster locations underway. Will use standard 12N biprop thrusters for EWSK. No NSSK planned.
   - Baselined electrical power to come from standard solar cell and NiH battery technology. Initial analysis of available power due to shadowing of solar array by antenna mesh based on lessons learned from MBSAT program which also uses 12m antenna.
   - Current baseline for TT&C is to use C-band for orbit raising and contingency. C-band is common and supported by numerous TT&C stations worldwide. Orbit raising interference TBD. On station TT&C will be thru Ka gateway beams. At least one gateway will be designated for spacecraft operations.

c. Program Controls:

1. Schedule – Initial program schedule attached. Schedule supports FCC filing date to bring frequencies into use by Feb 17, 2007. Identification of critical paths and validation of the overall schedule is underway. Mitigation plans for schedule risk items will be developed. Schedule driver expected to be 12m antenna subsystem including reflector and boom.

2. Major NCR Status – None.

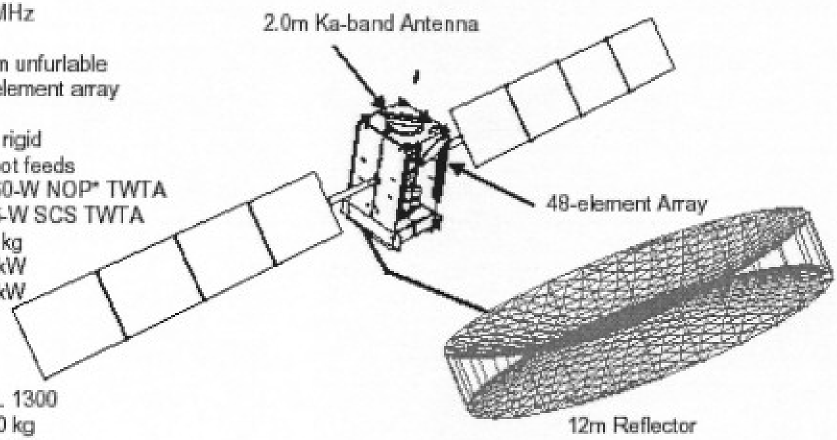
3. Class 1 Waivers, Deviations – None.

4. Status of Outstanding Action Items – See attached.

5. Invoice Status – No outstanding invoices. Received Milestone Payment No. 5.

6. Status of Contract Changes – None.

Celsat Spacecraft Key Features



Payload	
Channelization	20 MHz
S-band Antenna	
Reflector	12-m unfurlable
Feed	48 element array
Ka-band Antenna	
Reflector	2-m rigid
Feed	3 spot feeds
HPA S-band	48 50-W NOP* TWTA
Ka-band	9 35-W SCS TWTA
Mass	929 kg
DC Power	6.5 kW
Thermal Dissipation	3.3 kW

* NOP: Nominal Operating Point

Platform	SS/L 1300
Dry mass	2750 kg
Service life	12 years
Electrical Power	
DC Power	9.1 kW EOL
Solar Arrays	2 Si + 2 GaAs panels per wing
Batteries	2 32-cell 178-Ah NiH batteries
Propulsion	Bipropellant, 3140 kg storage tank, 12 AOCS thrusters, MST
Data Handing	SS/L Omega Superhub serial bus
Attitude Control	4-wheels, full-time Ring-Laser Gyros, earth and sun sensors
Station-keeping	+/- 6 deg NS
Thermal	Heatpipes, heaters, blankets, optical reflectors
Mechanisms	2 solar array drive assemblies
TT&C	C-band orbit-raising, Ka-band on-station, command encryption
Launch vehicles	Proton, Sealaunch, Ariane-5, Atlas-5, H2A

Primary EIRP Summary

NPR			dB	13.00	
TWTA sat				80.00	
OBO				2.00	
TWTA op point			W	50.48	
			dBW	17.03	
# of HPAs active				48.00	
total Pout			W	2422.88	
			dBW	33.84	
total loss for MPA and noise				-0.22	
retransmitted noise loss			dB		-0.01
IM noise HPAs	13.00 NPR		dB		-0.21
total loss for MPA and BFN coef quanti				-0.30	
HPA drive imbalance loss			dB		-0.10
phase/amp imbalce			dB		-0.20
beam coef quantization					0
ouput losses	feet	loss/ft	dB	-0.59	
coax to hybrid matrix, Gore 210	2.00	0.11	dB		-0.28
hybrid matrix	2.50	0.10	dB		-0.31
antenna loss			dB	-2.11	
coax to diplexer, gore 0.290	15.00	0.09	dB		-1.41
RRF/diplexer			dB		-0.40
element loss			dB		-0.15
reflector loss			dB		-0.05
freq. and mismatch			dB		-0.10
antenna random loss, RSS				0.00	
Manufacturing Tolerances			dB		0.00
Thermal Distortion			dB		0.00
Modelling uncertainty			dB		0.00
total loss HPAs to feeds				-3.00	
net Pout usefull			dBW	30.6	
net Pout usefull			W	1154.3	
av. Tx directivity			dBi	44.7	
EIRP, excluding IMs			dBW	75.3	
Spec				73.0	
Margin				2.3	

Primary G/T Summary

Input frequency						2000 MHz
antenna loss	feet	loss/ft			-1.27	dB
reflector loss						-0.10 dB
element loss						-0.15 dB
coax to TxRF/Dip	0.50	0.09	dB			-0.11 dB
RRF/diplexer						-0.30 dB
diplexer to LNA coax	5.00	0.09	dB			-0.51 dB
freq. and mismatch						-0.10 dB
antenna random loss					-0.32	dB
phase/amp imbalce						-0.10 dB
Manufacturing Tolerances						-0.10 dB
Thermal Distortion						-0.15 dB
Modelling uncertainty						-0.25 dB
Antenna Temp (250K), dBK					24.07	dBK
LNA-D/C N.F, dB				1.50		dB
contribution of processor + other				0.20		dB
AIM and PIM contributions				0.10		dB
NF at antenna element					1.80	dB
G/T average of Cells located at EOC					min	
Antenna Directivity, dBi					43.00	dBi
G/T, dB/K					15.55	dB/K
Specification, dB/K					15.00	
Margin, dB					0.55	
G/T average of EOBeam for Cells located at EOC					min	
Antenna Directivity, dBi					42.50	dBi
G/T, dB/K					15.05	dB/K
Specification, dB/K					15.00	dB/K
Margin, dB					0.05	dB

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Spacecraft Mass Budget

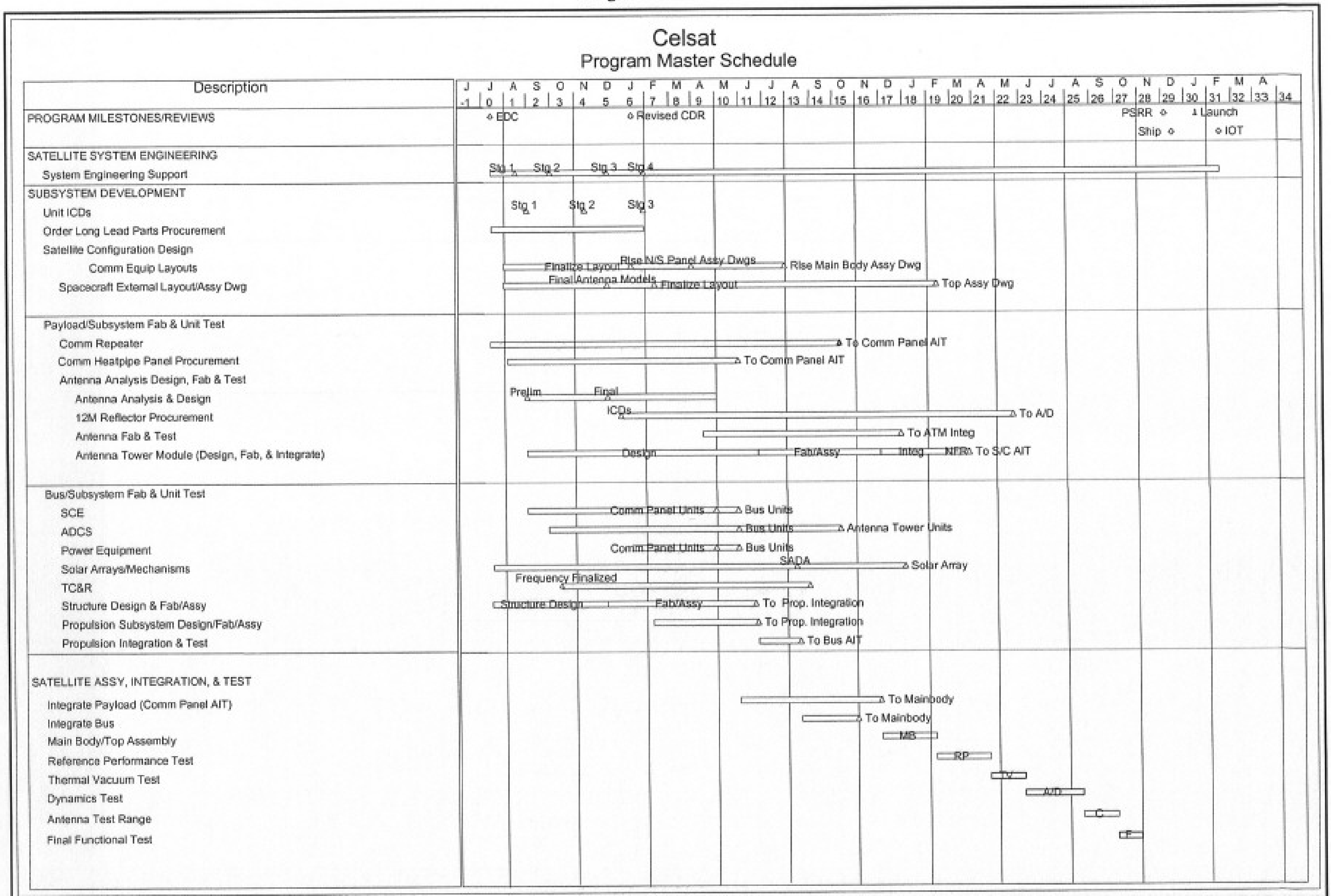
Subsystem	Mass (kg)	Risk (kg)	Risk %
Structure	483.5	33.8	7.0%
Mechanisms	18.7	0.3	1.8%
Propulsion	145.5	5.2	3.6%
Electrical Power	338.0	12.0	3.6%
Solar Array	170.9	6.8	4.0%
Repeater/Transponder	726.1	72.6	10.0%
Communications Antenna	202.9	20.3	10.0%
TT & C	16.6	0.8	5.0%
ADCS	73.0	1.5	2.0%
Data Handling System	88.7	3.1	3.5%
Thermal Control	176.5	12.4	7.0%
Electrical Integration	130.9	9.2	7.0%
Spacecraft-Dry Nominal	**2571.2**	**178.1**	**6.9%**
Spacecraft-Dry w/ Risk		**2749.3**	

Spacecraft Power Budget

SUBSYSTEM	Electrical Power (Watts) Summer Solstice	Autumnal Equinox	Eclipse
Payload	6518.4	6518.4	6518.4
DHS	175.5	175.5	175.5
TT&C	69.5	69.5	69.5
ADCS	109.6	109.6	109.6
Propulsion	5.8	5.8	5.8
EPS	156.9	156.9	116.9
Thermal	320.9	528.3	186.8
Harness	84.6	86.6	82.8
SUBSYSTEM TOTAL	**7441.2**	**7650.6**	**7265.3**
Battery Charging/Charging Loss	76.5	890.6	
Discharger Loss			739.2
Low-Voltage Converter Losses	53.3	57.2	59.6
Battery-PCU Harness Loss			92.4
SPACECRAFT TOTAL	**7570.9**	**8598.4**	**8156.5**
Solar Array Capability (@ EOL 12 yrs)	9490.7	10197.4	
S/A Shadowing Losses	906.6	714.4	
Solar Array Capability (Shadowing included)	8584.2	9483.0	
SOLAR ARRAY NO-FAILURE MARGIN	**13.4%**	**10.3%**	
S/A Failure Contingency (1 Hi-Pwr Circuits)	287.4	318.8	
Solar Array Capability (EOL with Shadowing/Failures)	8296.8	9164.2	
SOLAR ARRAY WORST-CASE MARGIN	**9.6%**	**6.6%**	
Available Battery Power			9239.4
WORST-CASE BATTERY DOD			**70.6%**
Batt Cell Failure Contingency (2 cells)			300.6
WORST-CASE BATTERY DOD			**73.0%**

SPACE SYSTEMS LORAL

Program Schedule



SPACE SYSTEMS LORAL

Celsat Action Items

Item	Date	Action	Comment	Status
1	4-Aug	Increase G		
1.1	4-Aug	Increase # Rx elements	+0.4dB improvement. S/C configuration and accommodation needs to be reviewed. Review cell-by-cell performance distribution	In process
2	4-Aug	Decrease Tsys		
2.1	4-Aug	Relook at losses and NF	Configuration driven.	In process
2.2	4-Aug	Use integrated antenna temperature on a beam	290K now used. Integrated earth temp over antenna FOV should reduce.	In process
3	4-Aug	Improve I		
	4-Aug	In-beam and beam-beam interference function of #users, #reuse, #beams.	To 1st order reducing #user/carrier helps. Reduced carrier capacity can be compensated by increasing reuse for total system.	In process
	4-Aug		Processing gain equation includes pilot tone term. Why? It is part of CDMA interface requirement	In process
	4-Aug		What is max #codes/carrier possible?	
4	4-Aug	Gateway architecture. Present approach distributes all spectrum for a set of feeds to a given GW for processing. Alternate approach is to allocate spectrum for all feeds to a given GW.	Alternate approach could improve system performance by minimizing multiple paths for phase control. Also, would allow time phased capacity growth by adding GWs with bw demand. However, increases s/c design - impact to s/c accommodation TBD.	In process
5	4-Aug	2 colocated satellites using coherent 2 aperture space combining.	Does XM use 2 Tx antennas to avoid multipaction and space combines signals from both antennas??? Yes, also it helps in link budget since each carrier is half in size	Closed
6	10-Aug	Means of reducing the downlink bandwidth and number of feederlink stations	Current design allows full 2x20 MHz per feed element. Tunable filters? Can we allocate S-band bandwidth to individual feeder link stations?	In process
7	10-Aug	Reference Program schedules with milestones	Supply reference schedule	Closed
8	10-Aug	Reference mass budgets	Supply reference mass budget	Closed
9	10-Aug	Reference Power Budgets	Supply refrerence power budget	Closed
10	10-Aug	Qualification status for 12m antennas	Same reflector as on MBSAT	Closed

Celsat Monthly Progress Report
For
October 10, 2004

a. Major Program Events:

- Submitted new design based on single S-band receive polarization approach. Assumes user terminals are circularly polarized and system does not use polarization diversity combining. New architecture reduces number of gateways from 3 to 2 which reduces overall system cost and potentially improves beamforming control.
- Received ROM cost and schedules from 12m antenna suppliers. Evaluating cost/risk/schedule.
- Initiated generation of repeater equipment mini-specifications to begin detailed design work of critical equipment items.
- Held status review meeting with Celsat on 21 September.
- A Product Assurance Program Manager is being assigned to oversee product assurance implementation per Exhibit C. Exhibit C, Product Assurance Program Plan, will verify facilities, parts, processes, procedures and personnel are appropriate and qualified for the Celsat satellite construction. SS/L's quality system is fully documented, and is available to all employees on-line through the company intranet. The quality system addresses the life cycle of SS/L's products from development through engineering, test, unit and component manufacturing, subsystem integration, and satellite assembly, integration and test (AIT), and launch.

b. Technical Status:

1. Spacecraft – See attached description for current design status summary. Basic spacecraft design is unchanged from previous report. Minor modifications for new repeater design accounted for.
   - Initial spacecraft assessment of modified payload design completed.
   - Updated mass, power, thermal, propellant analyses to incorporate modified payload design. Results show spacecraft is within normal design limits for satellite and launch vehicles.
   - Propellant analyses continues to show positive mass margin after incorporation of payload modifications.
   - Interfacing of spacecraft to candidate 4m fairing compatible launch vehicles is being evaluated
   - Continuing to work closely with potential antenna suppliers to define initial stowage and deployment interface requirements. Source selection to be made in the next few months.
   - Attitude control group evaluating inclined orbit operation and spacecraft requirement to fly 20-30 degrees off earth-pointing normal to obtain FOV and optimum antenna configuration. The incorporation of pointing control mechanism being evaluated.

2. Payload – The payload detailed design is underway. Antenna design is unchanged from previous report. Repeater equipment is updated for new design.

- Assessment of payload modifications for new design completed and incorporated in revised prelimary layout.
- Redundancy for critical repeater units added since "graceful" degradation from multiple pathways not possible since only single polarization pathway is implemented. 6 sets of 10:8 S-band TWTAs, 12 sets of 5:4 S-band LNAs for CONUS beams, 1 set of 4:2 S-band LNAs for HI and PR, 16 sets of 4:3 S-Ka upconverters for CONUS and 2 sets of 2:1 S-Ka upconverters for HI and PR. (see block diagram).
- Selection of payload load unit designs has begun.
- Analysis of 12m unfurlable antenna with 48 element array for CONUS and AK is in progress. Separate subarrays provide HI and PR/USVI coverage. Finalization of antenna design based on coverage area, performance, repeater equipment factor, and configuration and C/I will be completed over the next month. No changes are being made to the design which incorporates 46 elements for transmit and 48 elements for receive. Transmit and receive are being individually optimized. Continuing S-band antenna peformance trades between G/T, EIRP and C/I. Evaluation of different beam sizes for 0.35 and 0.5 degree spacings have been added to the optimizations for various scenarios of frequency reuse for capacity including K = 3 thru 12 cases. These are currently in process.
- Baseline repeater channelization initially unchanged: provides full 20MHz MSS band to support ground-based beamforming architecture using analog S-band channel filters. Since actual Celsat frequency allocation has not been determined, an analysis is being performed to determine the impact of a tunable filter to replace fixed 20 MHz bandwidth units. This would enable the satellite to tune to one or more segments of the MSS spectrum once the final allocations are determined by the FCC. Currently 4 to 5 MHz per system is expected to be allocated.
- In process of generating proposal for further investigation into calibration and pointing coefficient methodology to support ground-base beamforming. Detailed repeater equipment list being refined. Discussions with suppliers started.

3. Bus – The bus detailed design is underway. Bus subsystems are unchanged from previous report. Layout is modified for new repeater equipment items.
   - The current iPStar-type bus structure is expected to support the modified payload design. Main area of change on communications panel layouts.
   - Initial layout and configuration studies for new design started. Routing for redundancy requires additional layout time. Optimizing comm panel layout for payload performance.
   - No change to propulsion and station-keeping strategy caused by modified payload.
   - No change to electrical power design caused by modified payload.
   - Evaluating TT&C on-station command pathways for 2 gateway architecture used by modified payload.
   - In discussions with vendors to procure common bus components not presently in inventory.

c. Program Controls:

SPACE SYSTEMS LORAL

1. Schedule – Program schedule attached. Current program chedule still supports FCC filing date to bring frequencies into use by Feb 17, 2007. Schedule driver will be 12m antenna subsystem including reflector and boom. Unfurlable antenna system is on critical path. Schedule will be updated upon evaluation of antenna supplier proposals. Mitigation plan to be submitted based on schedule impacts.

2. Major NCR Status – None.

3. Class 1 Waivers, Deviations – None.

4. Status of Outstanding Action Items – See attached.

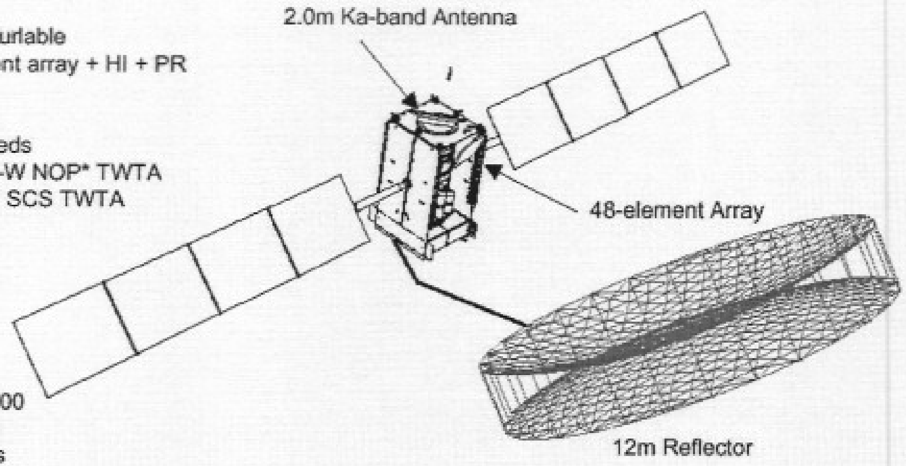
5. Invoice Status – No outstanding invoices. Received Milestone Payment No. 6.

6. Status of Contract Changes – None.

Celsat Spacecraft Key Features

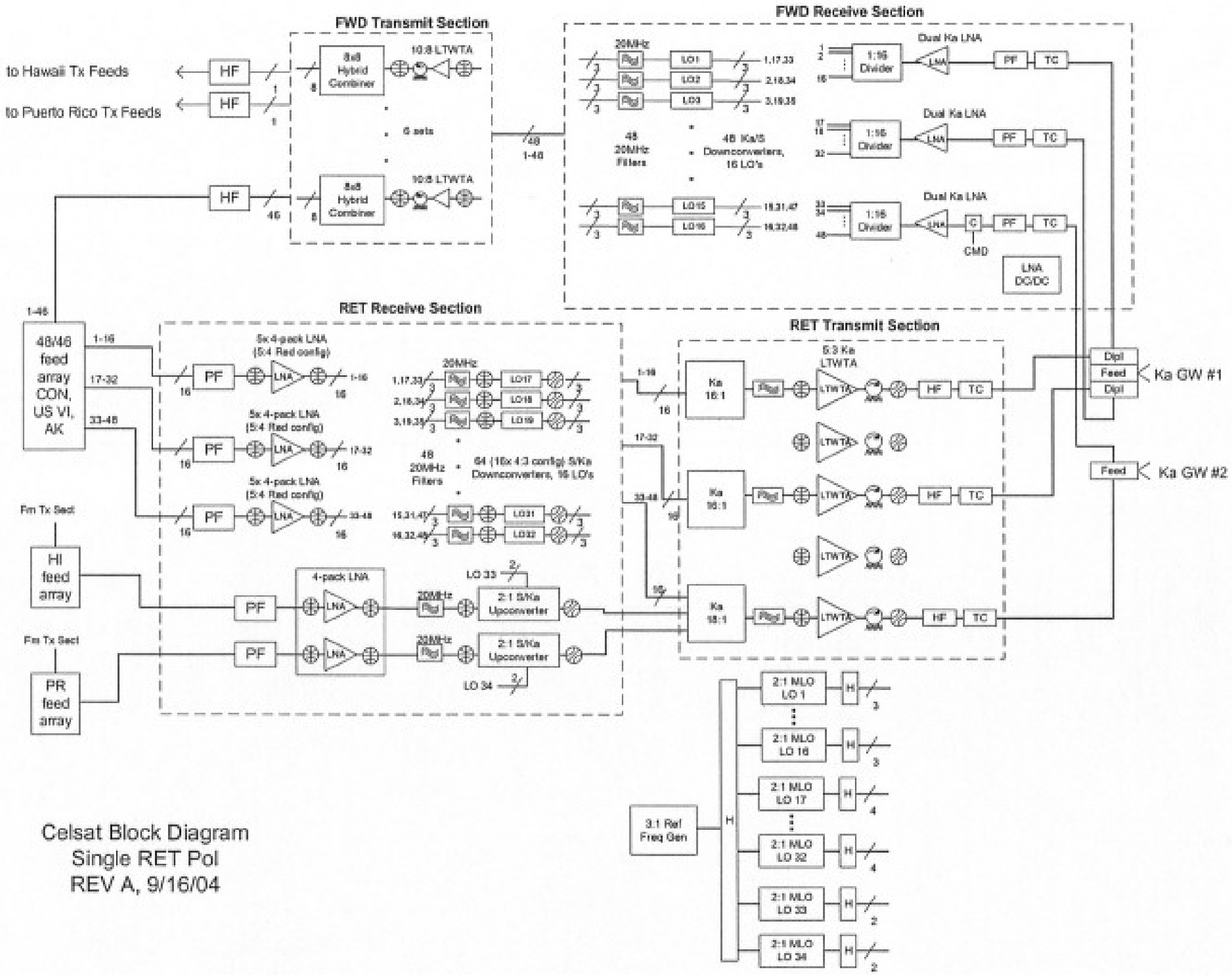
Channelization	20 MHz
S-band Antenna	
Reflector	12-m unfurlable
Feed	48 element array + HI + PR
Ka-band Antenna	
Reflector	2-m rigid
Feed	2 spot feeds
HPA S-band	60:48 45-W NOP* TWTA
Ka-band	5:3 35-W SCS TWTA
Mass	897 kg
DC Power	6.6 kW
Thermal Dissipation	3.1 kW

* NOP: Nominal Operating Point



Platform	SS/L 1300
Dry mass	2755 kg
Service life	12 years
Electrical Power	
DC Power	9.1 kW EOL
Solar Arrays	2 Si + 2 GaAs panels per wing
Batteries	2 32-cell 178-Ah NiH batteries
Propulsion	Bipropellant, 3140 kg storage tank, 12 AOCS thrusters, MST
Data Handing	SS/L Omega Superhub serial bus
Attitude Control	4-wheels, full-time Ring-Laser Gyros, earth and sun sensors
Station-keeping	+/- 6 deg NS
Thermal	Radiator panels, heatpipes, heaters, blankets, optical reflectors
Mechanisms	2 solar array drive assemblies
TT&C	C-band orbit-raising, Ka-band on-station, command encryption
Launch vehicles	4m (Proton, Sealaunch), 5m (Ariane-5, Atlas-5, H2A)

Payload Block Diagram



Celsat Block Diagram
Single RET Pol
REV A, 9/16/04

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Primary EIRP Summary

TWTA Psat			W	80	
TWTA backoff			dB	-2.5	
NPR			dB	13.00	
TWTA Pout @ NOP			W	44.99	
			dBW	16.53	
# of TWTAs active				48.00	
total Pout			W	2159.39	
			dBW	33.34	
retransmitted noise loss			dB		-0.01
IM noise SSPAs	13.00 NPR		dB		-0.22
SSPA drive imbalance loss			dB		-0.10
phase/amp imbalce			dB		-0.20
beam coef quantization					0
total loss for noise and MPA alignment				-0.53	
ouput losses	feet	loss/ft	dB	-0.59	
coax to hybrid matrix, Gore 210	2.00	0.11	dB		-0.28
hybrid matrix	2.50	0.10	dB		-0.31
antenna loss			dB	-2.67	
coax to harm filter, gore 0.290	15.00	0.08	dB		-1.19
Harmonic filter			dB		-0.15
coax to diplexer, gore 0.290	6.00	0.08	dB		-0.51
RRF/diplexer			dB		-0.40
element loss			dB		-0.22
reflector loss			dB		-0.10
freq. and mismatch			dB		-0.10
antenna random loss, RSS				-0.43	
Manufacturing Tolerances			dB		-0.25
Thermal Distortion			dB		-0.25
Modelling uncertainty			dB		-0.25
total resistive loss to feeds				-3.69	
net Pout usefull			dBW	29.12	
net Pout usefull			W	816.96	
av. Tx directivity (CONUS 153 cell grid)			dBi	44.85	
Predicted EIRP, excluding IMs			dBW	73.97	
Spec			dBW	73.0	
Margin			dB	1.0	

Primary G/T Summary

SPACE SYSTEMS LORAL

Primary/Secondary Coverage

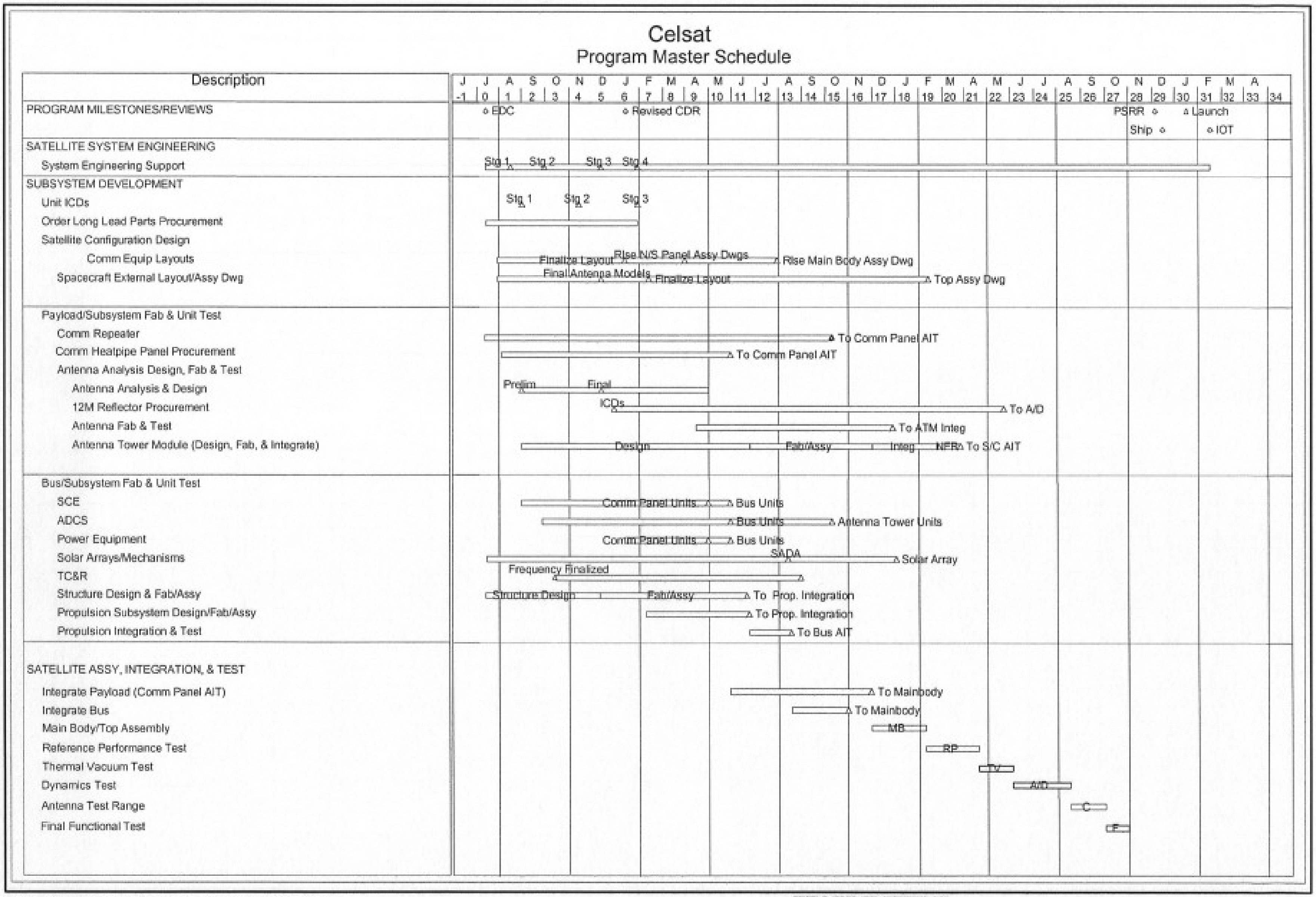
Input frequency					2010 MHz
antenna loss	feet	loss/ft		-1.68	dB
reflector loss					-0.10 dB
element loss					-0.22 dB
coax to TxRF/Dip	0.00	0.00	dB		0.00 dB
RRF/diplexer					-0.30 dB
diplexer to LNA coax	6.00	0.08	dB		-0.51 dB
Preselect filter					-0.45 dB
freq. and mismatch					-0.10 dB
antenna random loss				-0.44	dB
phase/amp imbalce					-0.10 dB
Manufacturing Tolerances					-0.25 dB
Thermal Distortion					-0.25 dB
Modelling uncertainty					-0.25 dB
Antenna Temp , dBK		255 degK		24.1	dBK
LNA-D/C N.F, dB				1.5	dB
Post LNA contribution				0.2	dB
AIM and PIM contributions				0.1	dB
NF at antenna element				3.5	dB
Tsys				611.2	K
				27.9	dBK
G/T AT AVERAGE OF EOC CELLS					
Antenna Directivity, dBi (CONUS 153 cell grid)				44.2	dBi
Misdirectivity				-0.4	dB
Predicted G/T, dB/K				15.9	dB/K
Specification, dB/K				15.0	dB/K
Margin, dB				0.9	dB
G/T AT AVERAGE OF EOB FOR EOC CELLS					
Antenna Directivity, dBi (CONUS 153 cell grid)				43.3	dBi
Misdirectivity				-0.4	dB
Predicted G/T, dB/K				15.0	dB/K
Specification, dB/K				15.0	dB/K
Margin, dB				0.0	dB

Spacecraft Mass Budget

Subsystem	Mass (kg)	Risk (kg)	Risk %
Structure	499.1	34.9	7.0%
Mechanisms	18.7	0.3	1.8%
Propulsion	145.5	5.2	3.6%
Electrical Power	338.0	12.0	3.6%
Solar Array	170.9	6.8	4.0%
Repeater/Transponder	694.4	69.4	10.0%
Communications Antenna	202.9	20.3	10.0%
TT & C	16.6	0.8	5.0%
ADCS	73.0	1.5	2.0%
Data Handling System	88.7	3.1	3.5%
Thermal Control	199.1	13.9	7.0%
Electrical Integration	130.9	9.2	7.0%
Spacecraft-Dry Nominal	2577.7	177.6	6.9%
Spacecraft-Dry w/ Risk	2755.4		

Spacecraft Power Budget

SUBSYSTEM	Electrical Power (Watts) Summer Solstice	Autumnal Equinox	Eclipse
Payload	6604.1	6604.1	6604.1
DHS	175.5	175.5	175.5
TT&C	69.5	69.5	69.5
ADCS	109.6	109.6	109.6
Propulsion	5.8	5.8	5.8
EPS	156.9	156.9	116.9
Thermal	320.9	528.3	186.8
Harness	85.4	87.5	83.7
SUBSYSTEM TOTAL	**7527.7**	**7737.2**	**7351.9**
Battery Charging/Charging Loss	76.5	890.6	
Discharger Loss			739.2
Low-Voltage Converter Losses	53.3	57.2	59.6
Battery-PCU Harness Loss			92.4
SPACECRAFT TOTAL	**7657.5**	**8685.0**	**8243.1**
Solar Array Capability (@ EOL 12 yrs)	9490.7	10197.4	
S/A Shadowing Losses	906.6	714.4	
Solar Array Capability (Shadowing included)	8584.2	9483.0	
SOLAR ARRAY NO-FAILURE MARGIN	**12.1%**	**9.2%**	
S/A Failure Contingency (1 Hi-Pwr Circuits)	287.4	318.8	
Solar Array Capability (EOL with Shadowing/Failures)	8296.8	9164.2	
SOLAR ARRAY WORST-CASE MARGIN	**8.3%**	**5.5%**	
Available Battery Power			9239.4
WORST-CASE BATTERY DOD			**71.4%**
Batt Cell Failure Contingency (2 cells)			300.6
WORST-CASE BATTERY DOD			**73.8%**



SPACE SYSTEMS LORAL

Celsat Action Items

Item	Date	Action	Comment	Status
1	4-Aug	Increase G		
1.1	4-Aug	Increase # Rx elements	+0.4dB improvement. S/C configuration and accommodation needs to be reviewed. Review cell-by-cell performance distribution. Cannot accommodate in current configuration.	Closed
2	4-Aug	Decrease Tsys		
2.1	4-Aug	Relook at losses and NF	Configuration driven. Major change to configuration impact.	Closed
2.2	4-Aug	Use integrated antenna temperature on a beam	290K now used. Integrated earth temp over antenna FOV should reduce. Use integrated earth temp of 255K.	Closed
3	4-Aug	Improve I		
	4-Aug	In-beam and beam-beam interference function of #users, #reuse, #beams.	To 1st order reducing #user/carrier helps. Reduced carrier capacity can be compensated by increasing reuse for total system.	In process
	4-Aug		Processing gain equation includes pilot tone term. Why? It is part of CDMA interface requirement? CDMA budget takes into account tone on user EIRP.	Closed
	4-Aug		What is max #codes/carrier possible? Assume upto 40 users per carrier.	Closed
4	4-Aug	Gateway architecture. Present approach distributes all spectrum for a set of feeds to a given GW for processing. Alternate approach is to allocate spectrum for all feeds to a given GW.	Alternate approach could improve system performance by minimizing multiple paths for phase control. Also, would allow time phased capacity growth by adding GWs with bw demand. However, increases s/c design - impact to s/c accommodation TBD.	In process
5	4-Aug	2 colocated satellites using coherent 2 aperture space combining.	Does XM use 2 Tx antennas to avoid multipaction and space combines signals from both antennas??? Yes, also it helps in link budget since each carrier is half in size	Closed
6	10-Aug	Means of reducing the downlink bandwidth and number of feederlink stations	Current design allows full 2x20 MHz per feed element. Tunable filters? Can we allocate S-band bandwidth to individual feeder link stations? Decision to stay with current design of 20MHz per feed.	Closed
7	10-Aug	Reference Program schedules with milestones	Supply reference schedule	Closed
8	10-Aug	Reference mass budgets	Supply reference mass budget	Closed
9	10-Aug	Reference Power Budgets	Supply refrerence power budget	Closed
10	10-Aug	Qualification status for 12m antennas	Same reflector as on MBSAT	Closed
11	1-Oct	Look at layout between feed horns and LNA with the objective of minimizing the runs of the interconnection cables. Goal is to decrease cable insertion loss by 0.5dB.	Ongoing. New configuration likely needed.	In process
12	1-Oct	Provide status update on efforts to reduce input feed loss		In process
13	1-Oct	Determine the impact of increasing E-W SK +/-0.1 degrees.	Reduced maneuvers, propellant savings, reduced mass	In process
14	1-Oct	Provide mass update on 12m antenna?	Data from suppliers	In process

SPACE SYSTEMS LORAL