

S96 Cassini ESA Uplink Test #2

- The second of two ORTs to test uplink handovers (transfers) from/to DSN/ESA in preparation for the ESA Cassini supports during the F-ring and Proximal orbits
 - Continuous uplink will be required
- First test was on DOY 298/October 24 with DSS-74 (New Norcia) and DSS-84 (Malargue)
- Second test over DSS-74 only
- Test was scheduled during Earth-pointed gap
 - 1896 bit rate throughout
- Downlink at all three frequencies: S-, X- and Ka-band
 - RSS3BRWAF Opmode

DSN and ESA Antennas

- DSN and ESA Coverage

	Pre	BOT	EOT	Post							
16	312	0530	0700	1020	1035	DSS-35 CAS	ESA UL TEST	RSS	6982 N750	1A1	
16	312	0815	0915	1130	1145	DSS-74 CAS	ESA UPLINK TEST		6983 0142	1A1	
16	312	0830	1000	1350	1405	DSS-54 CAS	ESA UL TEST	RSS	6982 N750	1A1	

- ESA track has 1hr Pre-Cal. Actual is 45min
- RSS will be monitoring the signals in the RSR at DSS-35 and DSS-54
- Possible real-time displays via web cam from ESA
- Will begin installation of PRSR at DSS-74 early on November 7th New Norcia time. Not likely to have it ready in time for ORT

What Happened During First ORT?

- Uplink transfers - scheduled vs actual

11:16 **DSS-54 transmitter on, Sweep**

11:40 **Uplink transfer from DSS-54 to DSS-74**

DSS-74 had transmitter on earlier – 113951 instead of 114000

DSS-54 had transmitter off late (operator error) - 114125 instead of 114005

1min34sec overlap instead of 5sec

12:35 **Uplink transfer from DSS-74 to DSS-54**

DSS-54 transmitter on at 123500

DSS-74 transmitter off at 123507 (two seconds late)

13:20 **Uplink transfer from DSS-54 to DSS-84**

Originally DSS-84 reported having problems with Doppler steering and cannot ramp uplink

Was going to abandon uplink transfer then said that they resolved problem

DSS-84 transmitter on at 131956 instead of 132000

DSS-54 transmitter off at 132005

14:10 **DSS-84 transmitter off**

DSS-84 transmitter off at 141008

14:30 **DSS-84 transmitter on, Sweep**

14:45 **Uplink transfer from DSS-84 to DSS-54**

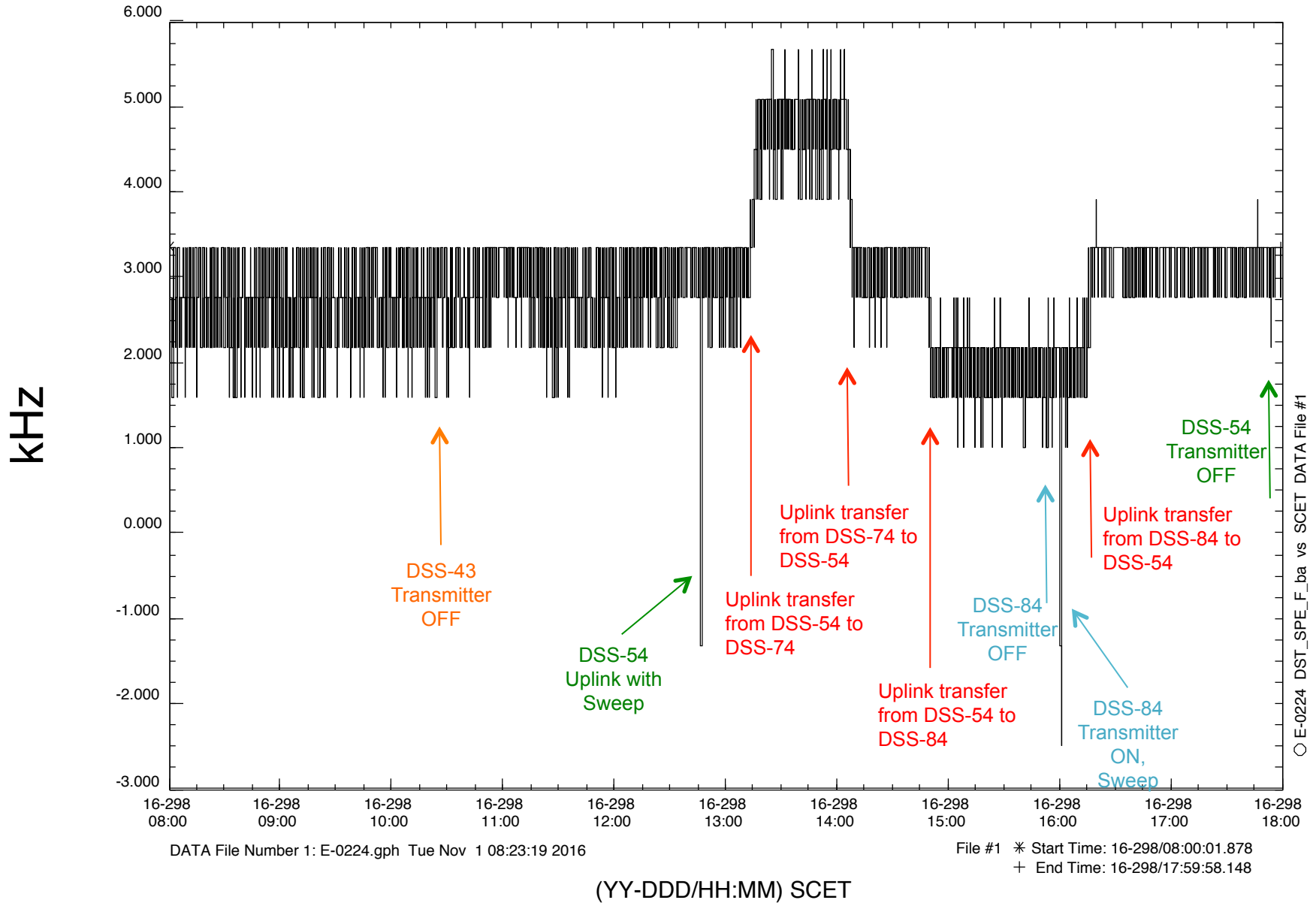
DSS-54 transmitter on at 144500

DSS-84 transmitter off at 144548

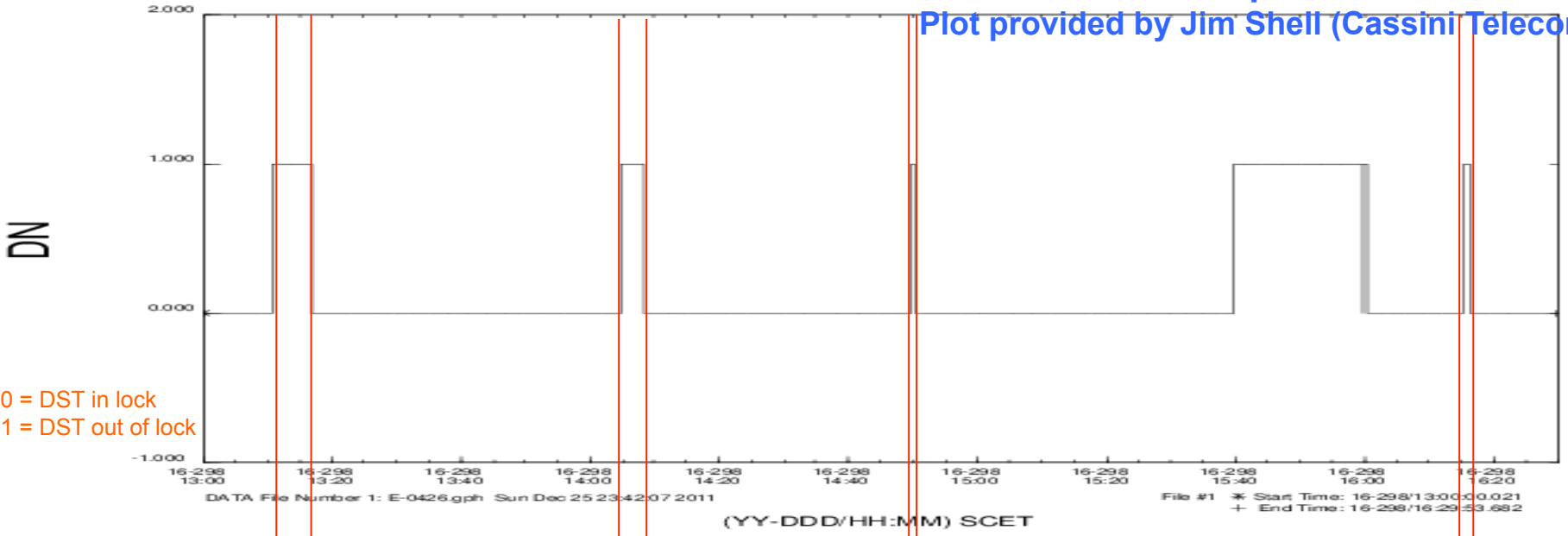
What Happened During First ORT? Cont'd

- ESA had trouble locking up on signals at times
 - Issues with frequency calculations. Re-calculated in real-time
- DSS-54 could not lock up using 3-way predicts
 - Had to use 2-way predicts instead
 - RSSG knew ahead of time during predicts analysis that 3-way predicts would not work and planned on using 2-way predicts during 3-way periods with ESA
 - DSS-54 ended up doing the same

E-0224 (DST_SPE_F_ba) vs SCET

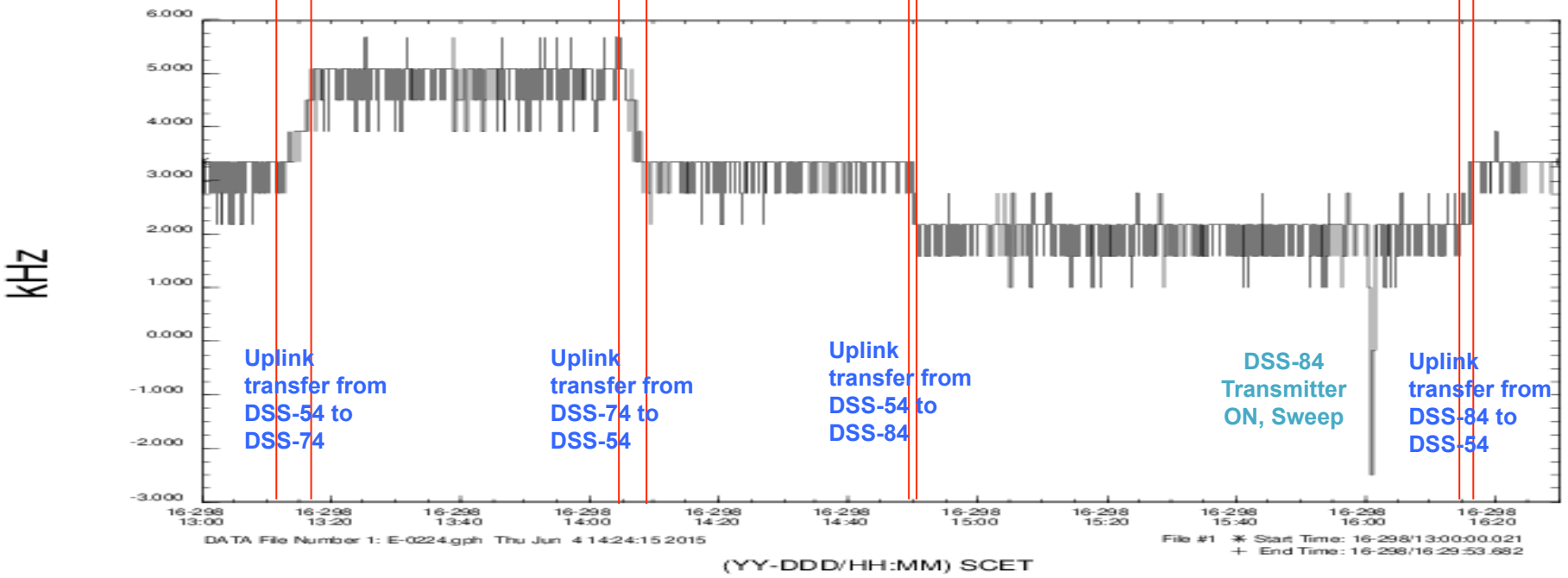


E-0426 (DST_RCVR_LCK) vs SCET



Zoom-In on Uplink Transfers
 Plot provided by Jim Shell (Cassini Telecom)

E-0224 (DST_SPE_F_ba) vs SCET



Lessons Learned From First ORT and Follow-up Items

- ESA cannot provide predicts in advance!
 - Can they provide uplink predicts post-pass?
- How is DSN going to generate 3-way predicts with ESA?
- ESA has to stop the open-loop recording every time they switched modes
 - Can't just change the predicts mode like we do on RSR
 - Will get a separate file for each mode
- ESA's automation scripts for Cassini activities are prepared by hand and require time to check and re-check the products before the pass
 - RSS needs to provide timelines earlier
 - Made a number of errors during the first test because the scripts were prepared a few hours before the supports
 - The errors encountered with the predicts were corrected
- One person was operating both stations?
 - Concern about workload during Proximal orbits?
- Need to understand why ESA uplink times are not per DKF
 - Add a few seconds to desired time

Misc

- Will have to provide ESA with latest OEM file
- Any changes to BLF?
 - What was provided for last ORT:
 - BLF (or XMTREF) = 7175025000 Hz
 - X-band TFREQ = 8427206307
 - S-band TFREQ = 2298328993
 - Ka-band TFREQ = 32023383967
- DKF has the correct uplink times for DSS-35 and DSS-54, but not for DSS-74
- DSN stations should be prepared for real-time uplink changes in case ESA stations encounter problems
- Utilize Monopulse at DSS-35 and DSS-54 but disable if problems are encountered
- Real-time communications with ESA stations over the VOCA on CAS OPS
 - Ask Ops Chief to connect
- ESA open-loop recording bandwidth: 16 KHz