# SciPlan2DLDV Requirements

## Purpose

Estimate science downlink and available downlink in AP1 and AP2, for the following purposes.

* Ensure plans allow for all science to downlinked by the time of planned firewalls (downlink aborts), with margin.
* Ensure plans allow for mission-critical downlink to be received by the needed time, with margin.
* Compare estimated downlink available and used at the planning stage (SciPlan) vs. the sequencing stage (DataTrack). Estimates at the sequencing stage vs. actuals in another tool.

## Inputs

### List of timelines for which calculate DLDV.

Maybe there should be a file on ixion which we can keep up-to-date with the most recent timeline for each load. This can be useful for other programs, like the post-calculation summary.

### Backlog at start of first timeline.

### SciPlan calculated timeline, tsv and sav

The “tsv” (actually, “pipe-separated”, not tab-separated, is saved in /raid/sciplan\_tmp/SciPlan/export/*timelinename*.tsv.

The same information, and more, is in the IDL save file, /raid/sciplan\_tmp/SciPlan/export/*timelinename*.sav.

### SciPlan MySql.

I expect there’s nothing there that isn’t in the tsv.

## Outputs

### First task: Comparisons with the DataTrack track schedule.

|  |  |  |  |
| --- | --- | --- | --- |
| Load: Name | StartUTC | Capacity | Balance |
| 15174:P12\_TRK\_174\_MAD\_ | 2015-174\_19:48:59 | 12.75 | 0.87 |
| 15174:P12\_TRK\_175\_post | 2015-175\_06:33:59 | 10.54 | 0.34 |

or in the same format as e.g., 15174.sci\_dldv? This gives how much data volume is available in each track. Where do we find these on Ixion? There is a file in /home/nhsciops/tools\_svn/dataTrack/schedule\_files/15174.sci\_dldv

DSN Track Name ~SSR PB Start Queued DV (MB) Avail DV (MB) Sci DV (MB) Sci DV(\*1.1) (Mbits)

P12\_TRK\_174\_MAD\_ 2015-174T19:48:59 0.170 1.924 1.754 14.028

P12\_TRK\_175\_post 2015-175T06:33:59 2.802 12.084 9.282 11.599

P12\_TRK\_176\_CAN\_ 2015-176T06:33:59 2.902 10.370 7.468 10.605

### Comparisons with the DataTrack DLDV.

### Backlog report.

Similar to Vals­. Each day: DLDV available; total HS data for each HS instrument, total LS data for each LS instrument.

## Algorithms

### Downlink Available on non-TCM days

* Length of track. How to identify the tracks? How to get the time?

|  |  |
| --- | --- |
| Visit Name | Visit Description |
| MOPS\_14363\_EST\_DL[1] | One 8hr Pass. Time TBD |
| TRK\_148\_1[1] | 6h50m |

Tell downlink VE's (visit elements) the names by: MOPS\*DL, or \*TRK\*.

Tell which tracks are on which days by the visit start time.

Tell the duration by one of two ways. If the SAP DBID [VE\_\_SUMM\_/ SAP\_DBID] is 0 (event marker) then look in the visit description. It will start "One 8hr Pass" or Two 8hr Pass". If the SAP DBID is not zero, than look in the duration.

Subtract 1 hour per track for setup, etc.

Subtract 1 hour per day for MOPs "normal ops" SC\_HK and SC\_ATT. Do this on the first track of the day.

Use the 20° rate for DLDV. 1297.95 bits/sec.

Subtract off SC\_HK, SC\_ATT during slews to/from earth. For now, assume a slew to and from each downlink. Was 50.2 byte/s (1.444836974 Mbit/hour), now 34.9 byte/s (1.00553512 Mbit/hour).

Subtract off standard SC\_HK, SC\_ATT during science blocks. **TBD**

* Observation-by-observation, subtract off additional DV: ATT for RCM, instrument headers/HK,

## Performance Requirements

There is no way this can be very accurate. Our expectation is that these can be good to 5%.

## Format of the TSV

The tsv file's header is two rows (I've started to fill it in here).

### The most useful fields

VE\_\_SUMM\_/SAP\_DBID : SAP DPID. 0 for Event marker, other for real SAPs.

VE\_\_VISIT\_/DESCRIPTION : Visit description. Text.

VE\_\_GNL\_/DURATION : Visit element duration. Seconds.

VE\_\_SUMM\_/VISIT\_DOYSTART : Start time of the visit. Format is 2015-161T01:34:00.

VE\_\_VISIT\_/COMMENTS : Visit comments. Some have DataTrack comments appended. If so, they have the following information separated by semicolons:

Val Cat; Alloc Comment; Compression (LOSSLESS); DLDV ; PEP\_Date; PEP\_InstructInput. For example.

DataTrack comment: ;1.445Mb DLDV; DL by ;SLEW;;1 hr slew; net SC\_HK Table6 vs Table 4, SC\_ATT T14 1 of 10 vs T8(?) 1 of 60

### File excerpt

VE\_\_SUMM\_ |VE\_\_SUMM\_ |VE\_\_SUMM\_ |VE\_\_SUMM\_ |VE\_\_SUMM\_ |VE\_\_SUMM\_

ENC\_PHASE |VE |VISIT\_ABSSTART |VISIT\_DOYSTART |VISIT\_START |VISIT\_NAME

AP1 |96 |2015-01-26T01:57:00 |2015-026T01:57:00 |-14637180 |NAV\_C2-L1\_NONCRIT\_026A

|VE\_\_SUMM\_ |VE\_\_SUMM\_ |VE\_\_SUMM\_

|SE\_NAME |SAP\_NAME |SAP\_DBID

| |PC5\_L1\_AP1\_AP2 |1271

|VE\_\_SUMM\_ |VE\_\_SUMM\_ |VE\_\_SUMM\_ |VE\_\_SUMM\_ |VE\_\_SUMM\_ |VE\_\_SUMM\_

|INSTRUMENT |MODE |TARGET |GC |MT\_LIST |ERR\_MSG

|LORRI |1x1, manual |Pluto+Charon |Pointed |4.1-1.2, 2.1-1.2 |

|71 |50 |-14637179 |5 |33 |1 |1 |5

|0.32 |0.32 |0.077 |201783680. |0.100 |1008.918 |14.09

|OpNav Campaign 2: Image Pluto and Charon |Image Pluto & Charon. 5 images. LORRI 1x1. DataTrack comment: LOSSLESS;21.6748Mb DLDV; DL by 2015-032;LORRI;Must be lossless, complete; downlink data/attitude info by day specified in PEP\_Date; download SC\_ATT before HS.;Deliver to Nav 02-Feb-2015 |96 |0 | | |50 |16 |10 |50 |-14637179 |-14637174 |5 |-14637174 |-14637141 |33 |-14637179 |5 |0 |0 | | |96 |67 |0 |1 |1 |96 |LORRI |1x1, manual |2 |96 |Pluto+Charon |0 |999 | | | |2 | | | |LORRI Normal |-X |1 |0.00000 |180.00000 |96 |3 |1 |1 |5 |5 |0.32 |0.32 |0.100 |1.000 |4.100 |45.900 |50.000 |4.100 |45.900 |50.000 |256.0 |906.0 |0.0 |256.0 |906.0 |0.0 |1 |0.0 |Normal |-Z |96 |T61 |DB10 (Alice) |325.0 |Rate 6 |17453. |1 |96 |5. |5. |5120.000 |5120.000 |1 |96 |0 |1.25 |0.0 |12632064 |1 |45.0 |0 |1024 |0.100 |1 | | |96 |-14637177 |2015-01-26T01:57:03 |2015-026T01:57:03 |0 |1195.000 |50.000 |1245.000 |1.000 | |800. |201783680. |14.09 |2.50 |83. |613. |0.0 |83. |613. |3394. |161427. |1613. |1618. |0 |4 |1 |256.0 |906.0 |0.0 |256.0 |906.0 |0.0 |50 | |96 |5 |0 |78950400 |5120 |80 |0.077 | | |0.077 |0.237 |1 |0 |0.077 |0.000 |0.077 |0.000 |0.237 |0.002 |0 |0 |0 |0 |0 |

|VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_

|PAD |SETUP |START\_TIME |DURATION |WRAPUP |N\_ALONG\_TRACK |N\_ACROSS\_TRACK

|VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_ |VE\_\_GNL\_

|N\_PER\_POINTING |N\_ALONG\_REQ |N\_ACROSS\_REQ |RAWSSR\_GBIT |TARGET\_RANGE |EXP\_TIME |RESN

|VE\_\_GNL\_ |VE\_\_VISIT\_ |VE\_\_VISIT\_

|SOLPHASE |DESCRIPTION |COMMENTS

|VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_

|VE |OFFSET |SETUP\_START |SETUP\_END |SETUP\_DUR |SETUP\_SSR |SETUP\_INSTR |SETUP\_GC

|VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_ |VE\_\_TIME\_

|OBS\_START |OBS\_END |OBS\_DUR |WRAP\_START |WRAP\_END |WRAP\_DUR |START\_TIME |DURATION

|VE\_\_TIME\_ |VE\_\_ERR\_ |VE\_\_ERR\_ |VE\_\_ERR\_

|N\_RED |N\_YELLOW |MSG

|VE\_\_SCIPLAN\_ |VE\_\_ID\_ |VE\_\_ID\_ |VE\_\_ID\_ |VE\_\_ID\_ |VE\_\_ID\_ |VE\_\_INSTR\_

|VER |VE\_INDEX |VISIT\_INDEX |SE\_INDEX |SE\_SEQUENCE |SE\_MASTER\_ID |VE

|VE\_\_INSTR\_ |VE\_\_INSTR\_ |VE\_\_INSTR\_ |VE\_\_TARGET\_ |VE\_\_TARGET\_ |VE\_\_TARGET\_

|NAME |MODE |TYPE |VE |NAME |TYPE

|VE\_\_TARGET\_ |VE\_\_TARGET\_ |VE\_\_TARGET\_ |VE\_\_OCTARGET\_ |VE\_\_OCTARGET\_ |VE\_\_OCTARGET\_

|SPICE\_CODE |RA\_DEG |DEC\_DEG |NAME |TYPE |SPICE\_CODE

|VE\_\_OCTARGET\_ |VE\_\_OCTARGET\_ |VE\_\_BORESIGHT\_ |VE\_\_BORESIGHT\_ |VE\_\_BORESIGHT\_ |VE\_\_BORESIGHT\_

|RA\_DEG |DEC\_DEG |NAME |APPROX |VALID |ALT

|VE\_\_BORESIGHT\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_

|AZ |VE |TYPE |N\_ALONG\_TRACK |N\_ACROSS\_TRACK |N\_PER\_POINTING

|VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_

|NTOT\_PER\_POINTING |N\_ALONG\_REQ |N\_ACROSS\_REQ |EXP\_TIME |IMAGE\_DT |ALONG\_DT\_MIN

|VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_

|ALONG\_DT\_PAD |ALONG\_DT |ACROSS\_DT\_MIN |ACROSS\_DT\_PAD |ACROSS\_DT |ALONG\_OVERLAP\_MIN

|VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_GC\_ |VE\_\_AXIS\_

|ALONG\_OVERLAP |ALONG\_OFFSET |ACROSS\_OVERLAP\_MIN |ACROSS\_OVERLAP |ACROSS\_OFFSET |VALID

|VE\_\_AXIS\_ |VE\_\_AXIS\_ |VE\_\_AXIS\_ |VE\_\_OBSDB\_ |VE\_\_OBSDB\_ |VE\_\_OBSDB\_ |VE\_\_OBSDB\_ |VE\_\_OBSDB\_

|RATE |TYPE |APPROX |VE |NUM |DBNAME |ATTDB |RATENAME

|VE\_\_OBSDB\_ |VE\_\_OBSDB\_ |VE\_\_FOV\_ |VE\_\_FOV\_ |VE\_\_FOV\_ |VE\_\_FOV\_ |VE\_\_FOV\_ |VE\_\_FOV\_

|RATE |VALID |VE |ALONG\_IFOV |ACROSS\_IFOV |ALONG |ACROSS |VALID

|VE\_\_CDH\_ |VE\_\_CDH\_ |VE\_\_CDH\_ |VE\_\_CDH\_ |VE\_\_CDH\_ |VE\_\_CDH\_ |VE\_\_CDH\_

|VE |SMOOTH |SSR\_FACTOR |IMAGE\_DT\_MIN |BITS\_PER\_N |N\_DEF |POINTING\_DT\_DEF

|VE\_\_CDH\_ |VE\_\_CDH\_ |VE\_\_CDH\_ |VE\_\_CDH\_ |VE\_\_CDH\_ |VE\_\_CDH\_

|FRACSEC |SECTORS\_PER\_N |EXP\_TIME |N\_TDI |LOW\_SPEED\_RATE\_DEF |HIGH\_SPEED\_RATE\_DEF

|VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_

|VE |MID\_TIME |MID\_DATETIME |MID\_DOYTIME |TARGET\_TYPE |TARGET\_RADIUS\_NOM

|VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_

|TARGET\_RADIUS\_PAD |TARGET\_RADIUS |TARGET\_FRACTION |JUST\_SUNLIT |POINTING\_CONTROL

|VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_

|TARGET\_RANGE |SOLPHASE |OPNAV\_SIGMA |ORBNORM\_ERR\_HW\_KM |PROJVEL\_ERR\_HW\_KM |ROLL\_ANGLE

|VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_ |VE\_\_GEOM\_

|ACROSS\_ERR\_HW\_KM |ALONG\_ERR\_HW\_KM |RADIAL\_ERR\_HW\_KM |POINTING\_ERR\_HW\_KM |ACROSS\_FW

|VE\_\_GEOM\_ |VE\_\_POINTED\_ |VE\_\_POINTED\_ |VE\_\_POINTED\_ |VE\_\_POINTED\_ |VE\_\_POINTED\_

|ALONG\_FW |DURATION\_FULL |DURATION |IMAGE\_DT |ALONG\_OVERLAP\_MIN |ALONG\_OVERLAP

|VE\_\_POINTED\_ |VE\_\_POINTED\_ |VE\_\_POINTED\_ |VE\_\_POINTED\_ |VE\_\_POINTED\_

|ALONG\_OFFSET |ACROSS\_OVERLAP\_MIN |ACROSS\_OVERLAP |ACROSS\_OFFSET |POINTING\_DT

|VE\_\_OCTIME\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_

|DURATION\_FULL |VE |N\_IM |HS\_RATE |HS\_BIT |HS\_SECTORS |HS\_CLUSTERS |HS\_GBIT

|VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_

|LS\_RATE |LS\_PREV\_VISIT\_NAME |GBIT |CUMUL\_GBIT |SSR1 |SSR2 |HS\_GBIT1

|VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_SSR\_ |VE\_\_RE\_ |VE\_\_RE\_

|HS\_GBIT2 |GBIT1 |GBIT2 |CUMUL\_GBIT1 |CUMUL\_GBIT2 |SETUP\_1SIDE |SETUP\_SSR\_1SIDE

|VE\_\_RE\_ |VE\_\_RE\_ |VE\_\_RE\_ |

|OFFSET |DURATION\_1SIDE |WRAPUP\_1SIDE |