

LRGS Overview

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Agenda

- What is LRGS?
- Monitoring an LRGS
- Data Acquisition for ...
 - GOES
 - Iridium
 - Data Logger Polling
- Data Retrieval Tools
 - Message Browser
 - Command-Line 'getDcpMessages'
 - DECODES
- DCP Monitor

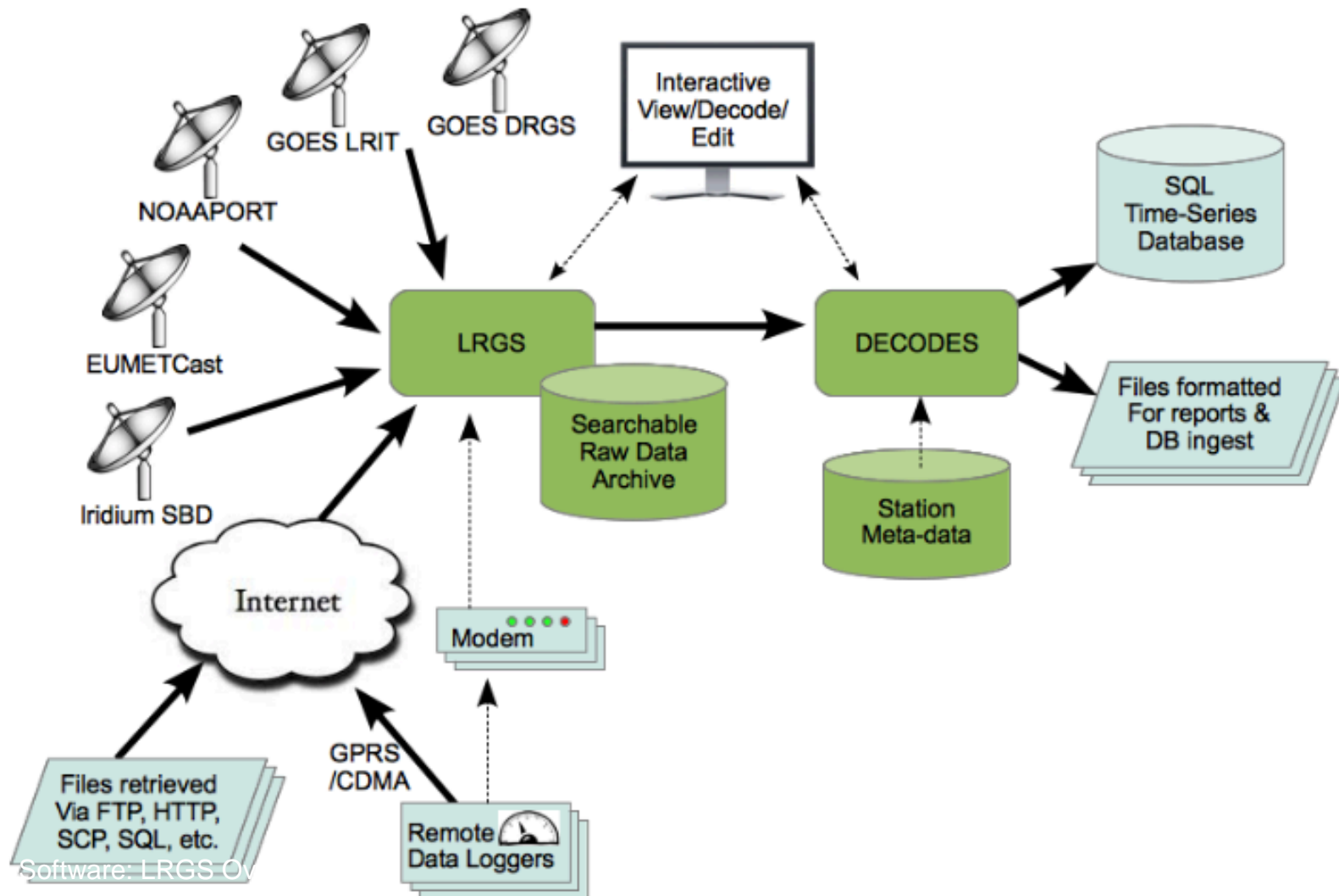
What is LRGS?

(Local Readout Ground Station)
(Lancaster Royal Grammar School)
(Linear Regression by Gibbs Sampling)
(Lakes Region Girls Softball)
(Long-term Research Grant Scheme)

LRGS

- Three Purposes:
 - Data Acquisition:
 - GOES (DRGS, LRIT/HRIT, DOMSAT, Network)
 - Iridium
 - Data Logger Polling
 - Short Term Archive
 - Configurable Number of Days
 - Distribution
 - LRGS clients connect via DDS (DCP Data Service) and pull data by a variety of criteria

LRGS



Monitoring LRGS via Web

https://dcs1.noaa.gov/Account/Login

NOAA HOME WEATHER OCEANS FISHERIES CHARTING SATELLITES CLIMATE RESEARCH COASTS CAREERS

NOAA GOES DATA COLLECTION SYSTEM
OFFICE OF SATELLITE AND PRODUCT OPERATIONS

>> Operational Notices
12/14/2017 17:39 UTC

>> Help Desk
24/7 Operations

>> System Information

>> Program Information

>> DADDS File Downloads
03/16/2018 14:00 UTC
pdts_compressed.txt
chans_by_baud.txt

>> Wallops Webservers
dcs1.noaa.gov
dcs2.noaa.gov

>> NSOF Webservers
dcs3.noaa.gov
dcs4.noaa.gov

>> **LRGS Status**

DCS Administration and Data Distribution
NOAA's System for Managing and Providing Access to Data from GOES DC

DADDS DCS1
User Login

Email

Password

SIGN IN

- Need a Login? Click
- Forgotten Password
- DCS Field Test? Click
- Need Help? Click
- 24/7 Technical Support
- DCS Operation

Submit an Application for GOES DCS SYSTEM

⚠ Notice to Users

****WARNING**WARNING**WARNING****

LRGS Summary Status

LRGS Summary Status

UTC: March 16, 2018 14:25:25 (Day 075)

<i>Host Name</i>	<i>Status Time</i>	<i>LRGS Status</i>	<i>Primary Downlink Status</i>	<i>Primary Quality Last Hour</i>	<i>Aggregate Quality Last Hour</i>	<i>Msgs This Hour</i>	<i>Num DDS Clients</i>	<i>ILEX LRGS Version</i>
cdadata.wcda.noaa.gov	03/16 14:25:23	OK	DRGS:Active	99.55%	99.55%	15403	102	9.1
cdabackup.wcda.noaa.gov	03/16 14:25:00	OK	DRGS:Active	99.56%	99.56%	15156	35	9.1
cdadrot.wcda.noaa.gov	03/16 14:25:18	OK	DOMSAT:Active	99.61%	99.61%	15291	11	9.1
nlrgs1.noaa.gov	03/16 14:18:22	OK	DRGS:Active	99.55%	99.55%	11229	6	9.1
nlrgs2.noaa.gov	03/16 14:23:28	OK	DRGS:Active	99.57%	99.57%	14379	5	9.1
lrgseddn1.cr.usgs.gov	03/16 14:25:25	OK	DDS:Active	99.55%	99.55%	15378	59	9.1
lrgseddn2.cr.usgs.gov	03/16 14:25:21	OK	DDS:Active	99.56%	99.56%	15551	30	9.1
lrgseddn3.cr.usgs.gov	03/16 14:25:18	OK	DDS:Active	99.55%	99.55%	15344	25	9.1

LRGS Status Detail

LRGS: cdadata.wcda.noaa.gov

UTC: March 16, 2018 14:27:55 (Day 075)

(Time reported by LRGS)

System Status: Running

LRGS Version: 9.1.OpenDCS-6.3w RC12 (May 22, 2017)

Archive Statistics

Messages In Storage: **24956965**

Oldest Msg Time: **02/13 23:59:52**

Next Idx #: **493676**

Hourly Data Collection Statistics

<i>Hour:</i>	<i>7-8</i>	<i>8-9</i>	<i>9-10</i>	<i>10-11</i>	<i>11-12</i>	<i>12-13</i>	<i>13-14</i>	<i>14-15</i>
GOES DRGS (Good/ParErr):	68741 / 316	68612 / 322	68756 / 272	68524 / 296	68438 / 304	68915 / 318	68757 / 282	34313 / 150
DDS Recv (Good/ParErr):	33869 / 165	33789 / 167	33867 / 151	33735 / 151	33728 / 164	33941 / 173	33867 / 152	16847 / 78
Archived (Good/ParErr):	33852 / 164	33798 / 162	33855 / 147	33756 / 145	33712 / 160	33945 / 171	33874 / 149	16842 / 74

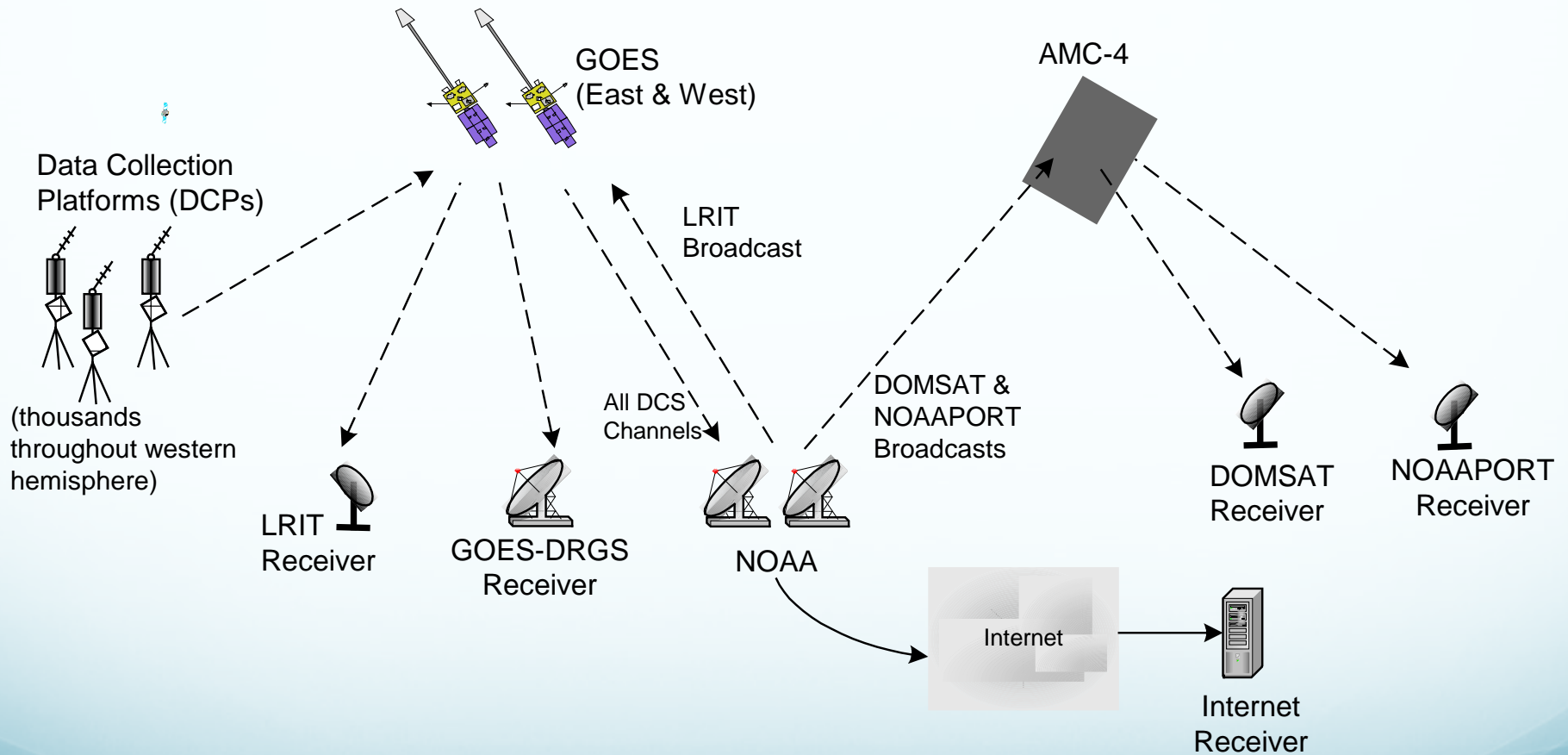
Downlink Statistics

<i>Downlink Name</i>	<i>Last Msg Rcv Time</i>	<i>Last Seq Num</i>	<i>Link Status</i>	<i>Link Params</i>
DRGS:Microcom-DRGS-BE	03/16 14:27:55	64351	Connected	
DRGS:Microcom-DRGS-PE	03/16 14:27:55	64353	Connected	
DRGS:Microcom-DRGS-BW	03/16 14:27:55	54820	Connected	
DRGS:Microcom-DRGS-PW	03/16 14:27:55	54820	Connected	
DDS:EDDN	03/16 14:27:55	-1	Real-Time	Primary
DDS:CDA-BACKUP	(none)	-1	Ready	Primary
DDS:NLRGS1	(none)	-1	Disconnected	Primary

Client Statistics

<i>Slot</i>	<i>Host Name</i>	<i>User</i>	<i>Msg Count</i>	<i>Last Activity Time</i>	<i>Last Msg Time</i>	<i>Status</i>
0	-	mtwatr	1	03/16 14:27:54	03/16 14:11:05	running
1	-	mtwatr	0	03/16 14:27:55	03/14 15:04:05	running

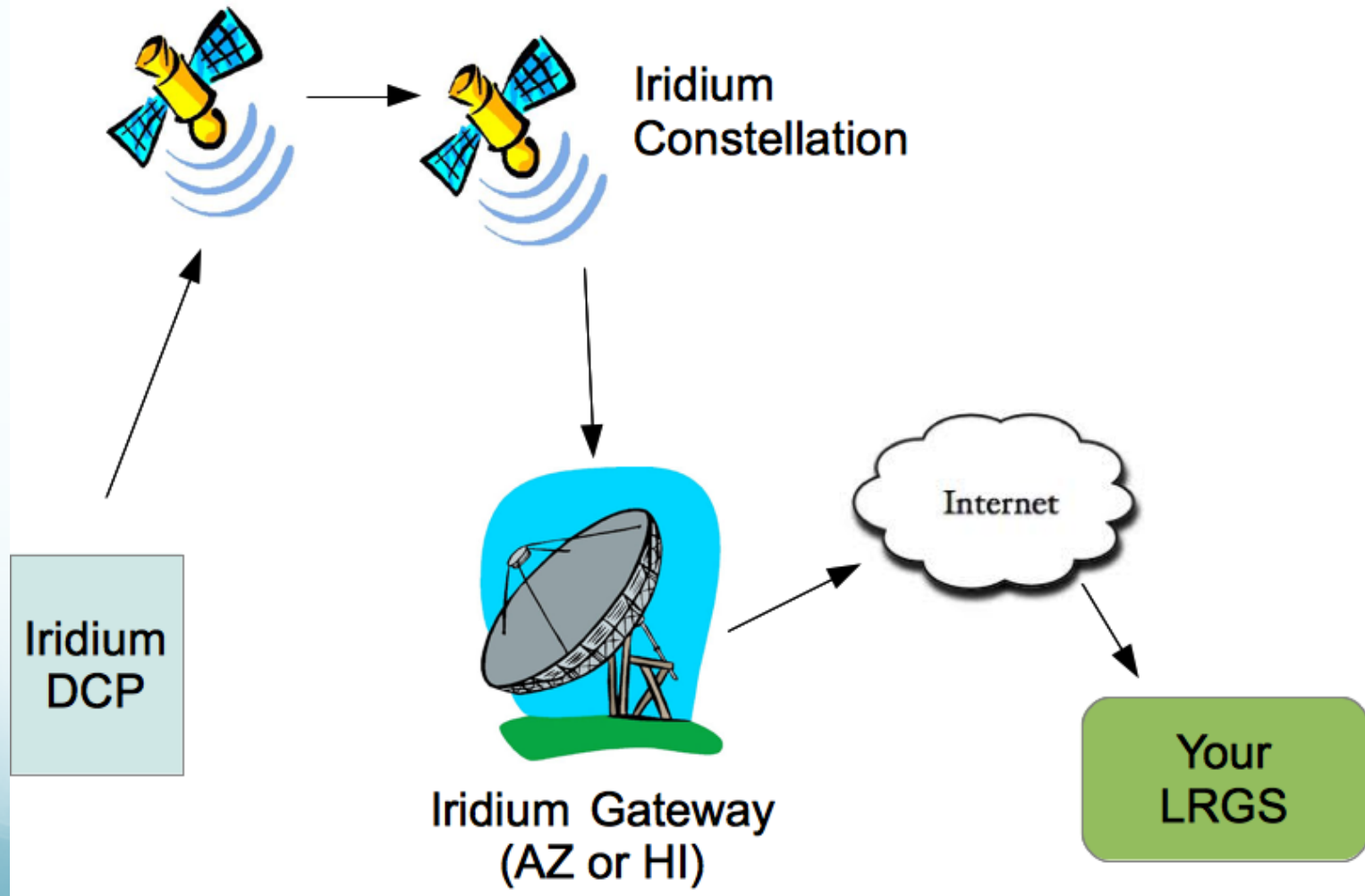
Data Acquisition for GOES



LRGS for GOES DCPs

- Can Receive GOES Data from ...
 - Network link to another LRGS (typically used for backup)
 - DRGS/DAMS-NT
 - LRIT/HRIT (via DAMS-NT interface)
 - DOMSAT
- Configuration Panel for each of the above
- Stores the First/Best copy of each message

Data Acquisition for Iridium



LRGS Iridium Config

- Port: (default=10800) LRGS opens listening socket on that port for incoming connections from Iridium Gateway
- Capture File: Raw data from each iridium session stored here – for debugging/troubleshooting only.

LRGS Configuration for: covesw1

NOAAPORT Iridium LRIT EDL Files Misc

Iridium Parameters

☐ Enable

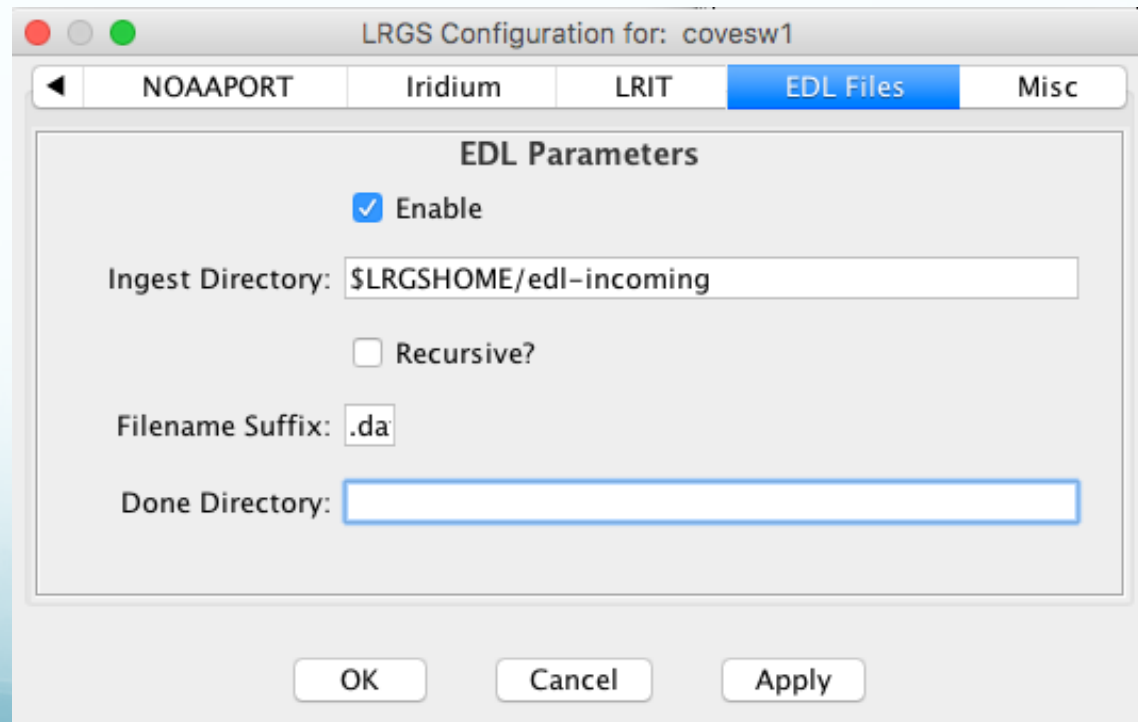
Port: 10800

Capture File:

OK Cancel Apply

Data Acquisition for Data Logger Polling

- Monitor a hot directory for incoming EDL (Electronic Data Logger) files.
 - Files must have EDL-style header containing
- Used by Polled-Logger (network, cellular, modem) interface
- Files are ingested into LRGS archive and then distributed to clients.



Required EDL Header

- LRGS needs to know how to index an EDL message by unique station identifier and time.

- Example:

//STATION RMTH

//SOURCE pakbus

//DEVICE END TIME 171102 041919 +0000

//POLL START 171102 041919 +0000

//POLL STOP 171102 041932 +0000

- The header *must* contain:
 - STATION – Unique Identifier – serves same purpose as DCP Address or IMEI
 - Some time stamp to serve as message transmit time

Rtstat Screen Showing EDL Files Coming In

Archive Statistics

Messages In Storage: **107775653**

Oldest Msg Time: **07/11 23:58:00**

Next Idx #: **564972**

Hourly Data Collection Statistics

<i>Hour:</i>	<i>7-8</i>	<i>8-9</i>	<i>9-10</i>	<i>10-11</i>	<i>11-12</i>	<i>12-13</i>	<i>13-14</i>	<i>14-15</i>
DOMSAT (Good/ParErr):	33380 / 185	33314 / 205	33529 / 176	33442 / 159	33394 / 167	33517 / 183	33374 / 314	15726 / 102
DOMSAT Dropped:	0	1	0	1	0	1	0	0
DDS Recv (Good/ParErr):	33364 / 220	33289 / 241	33520 / 203	33437 / 178	33397 / 181	33513 / 203	33389 / 363	15696 / 121
LRIT (Good/ParErr):	34375 / 190	34345 / 209	35538 / 186	34462 / 164	34314 / 170	33583 / 182	35221 / 334	15624 / 100
EDL Ingest:	181	186	190	184	185	190	191	195
Archived (Good/ParErr):	33625 / 204	33562 / 233	33780 / 207	33679 / 189	33643 / 181	33771 / 205	33638 / 374	15911 / 122

Downlink Statistics

<i>Downlink Name</i>	<i>Last Msg Rcv Time</i>	<i>Last Seq Num</i>	<i>Link Status</i>	<i>Link Params</i>
DomsatRecv	11/08 14:26:26	5209	Active	
LRIT:142.94.146.240	11/08 14:26:22	87493	Connected	
EDL-Input	11/08 14:17:35	102707	Enabled	
DDS:CDADATA	11/08 14:26:21	-1	Real-Time	Primary
DDS:EDDN1	11/05 17:13:03	-1	Ready	Primary
DDS:OpenDCSU	(none)	-1	Unused	Primary
DDS:EDDN2	(none)	-1	Ready	Primary
DDS:CDABACKUP	(none)	-1	Ready	Primary

Why put EDL Messages in LRGS?

- Centralize polling (and other methods for collection) in one place.
- Distribute EDL Messages throughout your LRGS network
- Distribute EDL Messages to other agencies
- Automatic short term backup, just like GOES DCP messages
 - 120 days is typical

Data Retrieval Tools

Download available from NOAA
All 100% Java (Runs on any OS)

Message Browser

File Help

Server

Host Name:

covesw3

Port:

16003

User Name:

covesw

Password:

.....

Connect

Search Criteria

File Name:

\$DCSTOOL_USERDIR/Messag

SelectEdit

Display Format

Before Msg:

\n=====\n

After Msg:

\n

Show:

Raw and Decoded

Decoded Format:

human-readable

Before Data:

----\n

After Data:

☐ Wrap long lines

Message for Platform Gathright-Adits

	CR1000_Battery	CR1000_Temp	R1_Battery	R2_Battery	R1_RFSigna
	Volt-CR1000	Temp-CR1000	Volt-R1	Volt-R2	Count-R1
UTC	V	degF	V	V	count
03/16/2018 16:00:00	519.0000	2018.0000	75.0000	1600.0000	13.3283

=====

DD69B05018075164633G46-0NN163EUB00174bB1P///@GS@GS@GS@GS@GS@GS@GS///@AB@AA@AA@A@@@?@@?@@~

Message for Platform Hanover

	Stage	Temp-Water	Cond	PH	Turb	D0	Battery
	Stage	Temp-Water	Cond	pH	Turb	D0	Volt-Batt
UTC	ft	degF	raw	pH	JTU	count	V
03/16/2018 15:00:00	4.67	62.00	91.0000	7.4000	3.1000	1.2900	
03/16/2018 15:15:00	4.67	63.00	91.0000	7.4000	3.2000	1.2900	
03/16/2018 15:30:00	4.67	63.00	90.0000	7.4000	3.2000	1.2900	
03/16/2018 15:45:00	4.67	64.00	91.0000	7.4000	3.1000	1.2900	
03/16/2018 16:00:00	4.67	65.00	90.0000	7.4000	3.3000	1.2900	missing
03/16/2018 16:15:00	4.67	65.00	90.0000	7.4000	3.3000	1.2900	
03/16/2018 16:30:00	4.67	66.00	90.0000	7.4000	3.2000	1.3000	

=====

DD69B05018075154633G46-0NN163EUP00174bB1P///@GS@GS@GS@GT@GT@GT@GT///@@?@@?@@~@@~@@}@@}

Message for Platform Hanover

	Stage	Temp-Water	Cond	PH	Turb	D0	Battery
--	-------	------------	------	----	------	----	---------

Display Next Display All Clear Save to File

Connected to covesw3:16003 as user covesw

Cove Software: LRGS Overview

Search Criteria Editor

The screenshot shows the 'Search Criteria Editor' application window. It has a standard macOS-style title bar with red, yellow, and green window control buttons. The window is divided into several sections:

- File**: A menu bar at the top.
- Date/Time**: Contains three dropdown menus: 'Since:' (set to 'Now'), 'Until:' (set to 'Now'), and 'Apply To:' (set to 'Local Receive Time'). There is also a '2 hours' dropdown and a checkbox for 'Ascending time order (may slow retrievals)'.
- Platform Selection**: A table with two columns: 'Type' and 'Value'. The 'Type' column lists 'Platform Name' for each entry. The 'Value' column lists various platform names. The entry 'OKVI4' is highlighted in blue. To the right of the table are five buttons: 'Enter Platform ID', 'Select Platform', 'Select from PDT', 'Add Network List', and 'Add GOES Channel'.
- Platform/Message Types**: A section on the right with several checkboxes: 'GOES Self Timed' (checked), 'GOES Random' (checked), 'Quality Notifications' (unchecked), 'GOES Spacecraft:' (unchecked, with a dropdown set to 'East'), 'Iridium' (unchecked), 'Network/Modem DCP' (unchecked), and 'Parity:' (unchecked, with a dropdown set to 'Good'). At the bottom of this section are two buttons: 'Clear All' and 'Select All'.

Type	Value
Platform Name	ALO14
Platform Name	Arkadelphia
Platform Name	BFD
Platform Name	BMD
Platform Name	BMD-tailwater
Platform Name	CRA14
Platform Name	Gathright-Adits
Platform Name	Gathright-Dam
Platform Name	GBYT2
Platform Name	Hanover
Platform Name	Moomaw
Platform Name	MROI4
Platform Name	OKVI4
Platform Name	ROWI4

Command-Line getDcpMessages

- Useful for automating retrievals in a script.

```
mmaloney-mbp:CWMS30 mmaloney$ bin/getDcpMessages -h lrgseddn3.cr.usgs.gov -u covesw -f MessageBrowser.sc -n
CE1842E018075174514G51-2NN073EXE00023 BST@TpAkx@Td@TjAkx@T|
CE1842E018075164514G50-2NN073EXE00023 BST@TtAkx@T|@TpAkx@Td
CE25F47818075174337G43-0NN161EXE00227":LL 13 #30 582.05 582.02 582.04 582.04 :RF 13 #30 0.46 0.46 0.46 0.46 :BV
 13 #30 14.2 14.2 14.2 14.2 :G3 13 #30 5.06 5.06 5.06 5.06 :G4 13 #30 1.31 1.31 1.31 1.31 :G6 13 #30 0.00 0.00
0.00 0.00 :G2 13 #30 0.00 0.00 0.00 0.00
CE25F47818075164337G43+0NN161EXE00227":LL 13 #30 582.04 582.04 582.04 582.06 :RF 13 #30 0.46 0.46 0.46 0.46 :BV
 13 #30 14.2 14.2 14.2 14.2 :G3 13 #30 5.06 5.06 5.06 5.06 :G4 13 #30 1.31 1.31 1.31 1.31 :G6 13 #30 0.00 0.00
0.00 0.00 :G2 13 #30 0.00 0.00 0.00 0.00
CE2DD63218075170623G47+0NN049EXE00078 BST@H~@Ed@Hu@H~@Ed@Hu@H}@Ed@Hu@H}@Ed@Ht@H}@Ed@Ht@H}@Ed@Ht@H}@Ed@Ht@H}@Ed@
Htj
```

DECODES

- Capabilities:
 - Receive data from:
 - LRGS, files, web scrape, logger-polling, sockets, FTP, SCP
 - DECODE any (?) DCP using GOES:
 - ASCII, Pseudo-Binary (several flavors), pure binary
 - Convert data to wide variety of formats:
 - SHEF, CSV, XML, JSON, ZRXP, many more
 - Send data directly to Time Series Databases:
 - Currently CWMS and HDB
 - Write output data to:
 - Files, Directories, Sockets, Pipes
 - Extensible
 - 100% Java – Runs on any modern OS

DCP Monitor Web App

- Available at www.covesw.com
 - Select group and # days backlog.
 - Contact info@covesw to have your DCPs added as a group.

Cove Software DCP Monitor

gth

☒ GOES List

☐ GOES Channel

☐ Polled DCP

☐ Iridium

Show current day plus days in the past.

DCP Monitor Web App

- Initial screen shows a whole day's messages for a selected group of DCPs.
 - Underscore = good message, other chars = failure codes

GOESList-oriole

www.covesw.com/dcpmon/dcpmon-top.jsf

Search

Most Visited Overview (Java Plat... Google Calendar Open Source DCS S... PWRE HDB Support mmaloneycove / ho... Google Voice - Inbo... Wait But Why

MVR-RIVERGAGES-DAS for 14 March 2018

DCP address	DCP name	Agency	First xmit time	Failure codes by hour of transmission																							
				0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Channel 29																											
16F8178C	SIRI2	MVR	00:03:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Channel 35																											
DE255304	FLNI4	MVR	00:14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DE25856C	CRWI4	MVR	00:14:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DF0047FE	MGOI4	MVR	00:20:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Channel 38																											
553250E2	LANM5	MVR	00:39:10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
55326578	DOBM5	MVR	00:39:20	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	
5532760E	TRCM5	MVR	00:39:30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Channel 49																											
CE7644BA	HUSM5	MVR	00:00:00	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	_W	
CE88B242	CDLI2	MVR	00:00:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CE637FAC	CRVI4	MVR	00:01:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CE628DD2	CTWI4	MVR	00:01:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CE628300	MROI4	MVR	00:02:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CE632102	BPLI4	MVR	00:02:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CE7CA61A	TAMI4	MVR	00:02:40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CE632FD0	MIWI4	MVR	00:03:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CE631498	ALOI4	MVR	00:03:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CE63093C	CIDI4	MVR	00:03:40	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	_V	
CE6307EE	CNEI4	MVR	00:04:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
CE6344E4	WAPI4	MVR	00:04:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Possible Failure Codes

Failure code legend

_ or G	Good DCP Message
?	DCP Message with Parity Error
A	DCP message contained a correctable address error
B	DCP message contained a bad (unknown) address
D	DCP message was duplicated (i.e. received on multiple channels)
I	DCP message had an invalid address
M	The DCP message for the referenced platform was missing (not received in its proper time slice)
N	The referenced platform has a non-complete entry in the DAPS Platform Description Table (PDT)
Q	DCP message had bad quality measurements
T	DCP message was received outside its proper time slice (early/late)
U	DCP message was unexpected
W	DCP message was received on the wrong channel
C	Excessive carrier before start of message
S	Low signal strength
F	Excessive frequency offset
X	Bad modulation index
V	Low battery voltage

DCP Monitor Web App

- Click DCP Name to view list of msgs for day:

GREI2

DCP Address: CE752652
First transmit window: 00:54:20
Self-timed channel: 49
Transmission interval: 01:00:00
Transmission window: 10
Baud rate: 300

GOES channel	Date	Transmit start	Transmit end	Window start	Window end	Failure code	Signal strength	Message length	Frequency offset	Modulation index	DRGS code	Battery voltage
49	03/14/2018	00:54:27.8	00:54:30.0	00:54:20	00:54:30	GT	45	91	0	N	UB	12.2
49	03/14/2018	01:54:27.8	01:54:30.0	01:54:20	01:54:30	GT	46	91	0	N	UP	12.2
49	03/14/2018	02:54:27.8	02:54:30.0	02:54:20	02:54:30	GT	45	91	0	N	UP	12.2
49	03/14/2018	03:54:27.8	03:54:30.0	03:54:20	03:54:30	GT	45	91	0	N	UP	12.2
49	03/14/2018	04:54:27.8	04:54:30.0	04:54:20	04:54:30	GT	45	91	0	N	UB	12.2
49	03/14/2018	05:54:27.8	05:54:30.0	05:54:20	05:54:30	GT	45	91	0	N	UB	12.2
49	03/14/2018	06:54:27.8	06:54:30.0	06:54:20	06:54:30	GT	46	91	0	N	UP	12.2
49	03/14/2018	07:54:27.8	07:54:30.0	07:54:20	07:54:30	GT	45	91	0	N	UP	12.2
49	03/14/2018	08:54:27.8	08:54:30.0	08:54:20	08:54:30	GT	45	91	0	N	UB	11.9
49	03/14/2018	09:54:27.8	09:54:30.0	09:54:20	09:54:30	GT	46	91	0	N	UP	11.9
49	03/14/2018	10:54:27.8	10:54:30.0	10:54:20	10:54:30	GT	45	91	0	N	UP	11.9
49	03/14/2018	11:54:27.8	11:54:30.0	11:54:20	11:54:30	GT	45	91	0	N	UP	11.9
49	03/14/2018	12:54:27.8	12:54:30.0	12:54:20	12:54:30	GT	45	91	0	N	UP	11.9
49	03/14/2018	13:54:27.8	13:54:30.0	13:54:20	13:54:30	GT	45	91	0	N	UP	14.1
49	03/14/2018	14:54:27.8	14:54:30.0	14:54:20	14:54:30	GT	45	91	0	N	UP	13.4
49	03/14/2018	15:54:27.8	15:54:30.0	15:54:20	15:54:30	GT	45	91	-1	N	UP	13.7
49	03/14/2018	16:54:27.8	16:54:30.0	16:54:20	16:54:30	GT	45	91	-1	N	UP	13.7
49	03/14/2018	17:54:27.8	17:54:30.0	17:54:20	17:54:30	GT	45	91	-1	N	UP	13.7

DCP Monitor Web App

- Click Start Time to view Raw & Decoded Message

GREI2 - 03/14/2018 09:54:27.8 (UTC)
Salt Creek near Greenview, IL (USGS)

Message Parameters:

DCP Address: CE752652	Quality Codes: GT
Signal Strength: 46 dBm	Frequency Offset: 0 (* 50 Hz)
GOES Channel: 49E	Message Length: 54 (bytes)
DRGS code: UP	Battery: 11.9 (volts)
Carrier Start (UTC): 09:54:27.8	Carrier Stop (UTC): 09:54:30.0

Raw Data:

CE75265218073095428G46-0NN049EUP00054 BCT@D^@D @D^@D @D @D`@D`@D`A~gA~gA~gA~gA~gA~ge

Decoded Data:

UTC	HG HG ft	PC PC in	VB VB V
03/14/2018 08:00:00	2.88	81.03	
03/14/2018 08:15:00	2.88	81.03	
03/14/2018 08:30:00	2.88	81.03	
03/14/2018 08:45:00	2.87	81.03	
03/14/2018 09:00:00	2.87	81.03	11.873
03/14/2018 09:15:00	2.86	81.03	
03/14/2018 09:30:00	2.87	81.03	
03/14/2018 09:45:00	2.86	81.03	

Thank You!

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