

Memo

Date: April 11, 2016
To: Kevin Stewart
From: Markus Ritsch
Subject: March 2016 ALERT Data Analysis

I. ALERT Data Source

Raw ALERT data records extracted from the Urban Drainage and Flood Control District's NovaStar 5 base station were analyzed for the period March 1 through March 31, 2016.

II. General System Analysis Summary

The District receives data through both the legacy ALERT channel and through the ALERT2 (concentrator plus A2 self-reports) channel. The following (Table 1) quantifies the data reports received by each channel.

Table 1. Reception of Data at Diamond Hill (Legacy, ALERT2 and Concentrator Reports from Recdatalog)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
Legacy	118,519	264,375	241,517										624,411
Concentrator	194,948	418,430	407,965										1,021,343
ALERT2	136,144	399,530	505,195										1,040,869
TOTAL	449,611	1,082,335	1,154,677	0	0	0	0	0	0	0	0	0	2,686,623
Conc/Leg	1.64	1.58	1.69	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.64
DataChron	645,913	662,847	674,426										1,983,186

The District operates two redundant NovaStar5 base stations: the primary (ns5a) at Diamond Hill and a redundant base (ns5b) at Greenhouse Data. Additional analyses are conducted on the data received by these two base stations (Table 2). The data received by both base stations for the month are shown below.

Table 2. Comparison of Data Reception by ns5a and ns5b

NS5A (Diamond Hill)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
Legacy	118,519	264,375	241,517										624,411
Concentrator	194,948	418,430	407,965										1,021,343
ALERT2	136,144	399,530	505,195										1,040,869
NS5B (Greenhouse)													
Legacy	118,610	264,516	263,959										647,085
Concentrator	194,968	418,532	446,510										1,060,010
ALERT2	136,330	399,841	552,747										1,088,918
Diff (NS5a-NS5b)													
Legacy (Digi One)	-91	-141	-22,442	0	0	0	0	0	0	0	0	0	-22,674
Concentrator (B2010)	-20	-102	-38,545	0	0	0	0	0	0	0	0	0	-38,667
ALERT2 (B2010)	-186	-311	-47,552	0	0	0	0	0	0	0	0	0	-48,049
Comments	Recdatalog format changed...missing 1/3 of the month		DH base was down for a period										

The reception rates between Diamond Hill and Greenhouse very greatly this month. Network outages were experienced on March 1, 18, 21 and 29th which caused outages in data reception from the IP connections. Additionally, the base station at Diamond Hill was down for a period toward the end of the month.

The daily ratio of total concentrator reports received versus total legacy ALERT reports received is shown (Figure 1).

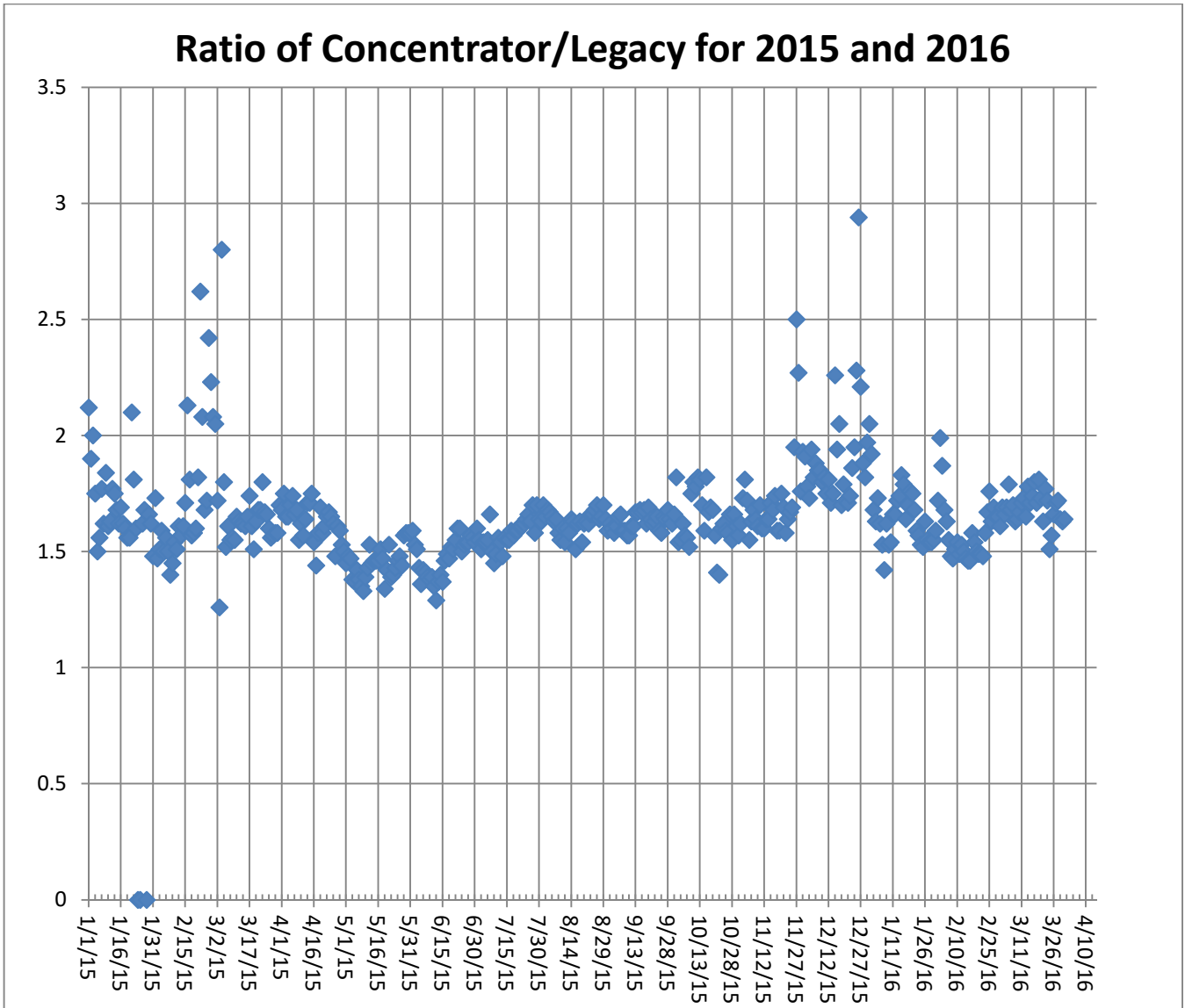


Figure 1. Daily Ratio of Concentrator Reports to Legacy Reports

The ratio becomes more volatile in the cold months as the Blue Mountain repeater has problems with legacy ALERT reporting when the temperature drops.

A. Continuous Operation of Base Receiver/Decoder

The base station was **not** in continuous operation for the entire month. Data was collected on a continuous basis for every hour of every day except for March 13th between 1:59:47 AM and 3:00:05 AM. The data outage was present in the log files from Greenhouse, Diamond Hill and OneRain. Since the outage was present on all three receiving base stations within the District and the fact that it occurred at 2:00 AM on March 13th points to the fact that it was likely due to the switch to daylight savings time. So.....the base station was in continuous operation for the entire month.

Outages of less than one hour are not identified.

B. Specific Issues Identified

Performance of the following sensors (Table 3) was questionable this month.

Table 3. Sensors with Poor Performance Characteristics

Sensor ID	Description	Comments
2790	Wx-West Cherry Cr	Poor event performance and timer
10026	Wx-A2-Trumbull	Poor event performance
5940	Log Jumper	Poor event performance and timer
4470	Little Narrows	Poor timer performance
4850	Porphory Mtn	Poor timer performance
721, 722, 726, 727, 728	Unknown IDs	Possibly coming from Confluence Pond (720)
2271, 2272, 2274	Unknown IDs	Possibly coming from Cub Creek below Blue (2270)
1041, 1042, 1044, 1046, 1048	Unknown IDs	Possibly coming from Lena Gulch @ Hwy 6 (1040)
623	Unknown ID with a large number of reports	

C. Performance of New A2 Sites

This section of the report will look at specific reporting characteristics of the new A2 sites by analyzing their APDUID (Application PDU Identifier). The APDUID is a cyclical, incrementing counter from 0 to 6. Tracking skipped values and restarts of the application control byte counter provides useful insight into site performance and general network health. The performance of the cyclical counter is quantified for each A2 self-reporting site and repeater path (Table 4).

Table 4. APDUID Performance of A2 Sites by Source Address

Description	ID	W. Creek (6001)	Smoky Hill (6502)	Blue Mt. (6503)	Lee Hill (6505)	Gold Hill (6506)
Newlin Gulch	3070		0.900	0.991	0.993	0.979
Heritage Regional Park	3090		0.985	0.989	0.993	0.987
Magnolia	6601		0.984	0.992	0.996	0.994
Blackstone	10010		1.00	1.00	1.00	1.00
ETG @ Hampden	10011		1.00	1.00	1.00	1.00
Carr Street (100)	10012		0.969	0.995	0.966	0.956
Maple Grove (1000)	10013		0.986	0.997	0.997	0.985
Upper Sellers	10014	n/a				
Haystack Road	10015	n/a				
Sand Cr at Colfax	10016		0.985	0.983	0.993	0.989
James Creek	10017		0.908	--	1.00	0.954
Lower Left Hand (4453)	10018		0.915	--	1.00	0.643
Murphy Creek (870)	10019		0.997	0.996	0.997	0.993
OneRain Weather	10020		0.909	0.932	0.977	0.988
S. St. Vrain at Berry Ridge	10021		--	--	0.995	0.600
Arvada/Blunn Reservoir	10022		0.991	0.991	0.958	0.987
Havana Pond	10023		0.995	0.997	0.997	0.995
Westerly Creek Dam	10024		0.998	0.998	0.997	0.998
Lena @ Nolte Pond (1023)	10025		0.993	1.00	1.00	0.986
Trumbull (Hayman)	10026	0.848				
West Creek (Hayman)	10027	--				
Diamond Hill (1420)	10028		0.996	0.996	0.994	0.991
Plum Creek at Sedalia	10029	0.975				
Coal Creek at McCaslin	10030		0.981	0.996	0.994	0.989
Boulder Cr. Broadway (4583)	10031		0.985	0.741	0.975	0.996
Weir Gulch	10032		0.952	0.957	0.991	0.924
Side Creek Park	10033					

D. ALERT2 Repeater Loading

The ALERT2 architecture utilizes 5 repeaters with a single transmit frequency (170.300 MHz) to Diamond Hill. The repeaters utilize a 20 second frame where each repeater is allocated a slot of specific size and an offset within the frame. The slot allocated to each repeater is sized appropriately to accommodate the total number of existing and future remote sites routed through that repeater. Each repeater is shown along with its designated slot (Table 5). Currently there is no pass-listing for the ALERT2 repeaters. Any remote ALERT2 site can be received by all repeaters and re-broadcast to the base except for West Creek which has an input frequency unique to Douglas County.

Table 5. ALERT2 Repeater Architecture

Repeater	Slot Size (sec)	Slot Offset (sec)	Source Address	ALERT2 Input Frequency (MHz)	ALERT2 Output Frequency (MHz) – received at Diamond Hill
West Creek	2	0	6001	169.425	170.300
Smoky	3	2	6502	169.525	170.300
Blue Mt.	4	5	6503	169.525	170.300
Lee Hill	3	9	6505	169.525	170.300
Gold Hill	3	12	6506	169.525	170.300
Magnolia	5	15	6507		170.300
Frame Size	20				

The following tables summarize the total number of reports received through each repeater (Table 6). This helps to quantify repeater loading for the ALERT2 backbone.

Table 6. ALERT2 Reports Received through Each Repeater (Only A2 Self Reports)

Month-Yr	West Creek (6001)	Smoky (6502)	Blue Mt. (6503)	Lee Hill (6505)	Gold Hill (6506)	TOTAL
Jan-15	0	44,501	44,636	44,783	39,007	172,927
Feb-15	0	58,543	56,150	61,160	57,764	233,617
Mar-15	346	73,198	69,604	77,968	65,323	286,439
Apr-15	595	73,711	69,568	79,215	72,310	295,399
May-15	5,259	78,694	72,340	86,297	77,174	319,764
June-15	11,987	72,449	65,742	82,998	69,570	302,746
July-15	28,595	75,379	71,394	79,026	74,041	328,435
Aug-15	28,409	92,299	84,057	84,363	87,211	376,339
Sep-15	26,809	84,143	84,776	84,289	85,123	365,140
Oct-15	19,775	82,683	83,390	63,475**	84,825	334,148
Nov-15	6,438	62,615	61,477	50,888	58,004	239,422
Dec-15	9,835	72,886	72,465	73,431	47,996	276,613
Jan-16	4,034	38,348	36,826	37,168	19,768	138,160
Feb-16	11,732	93,120	99,206	96,284	99,188	399,530
Mar-16	12,533	126,123	134,329	140,226	139,536	552,747

** - The number of reports coming through Lee Hill declined in October

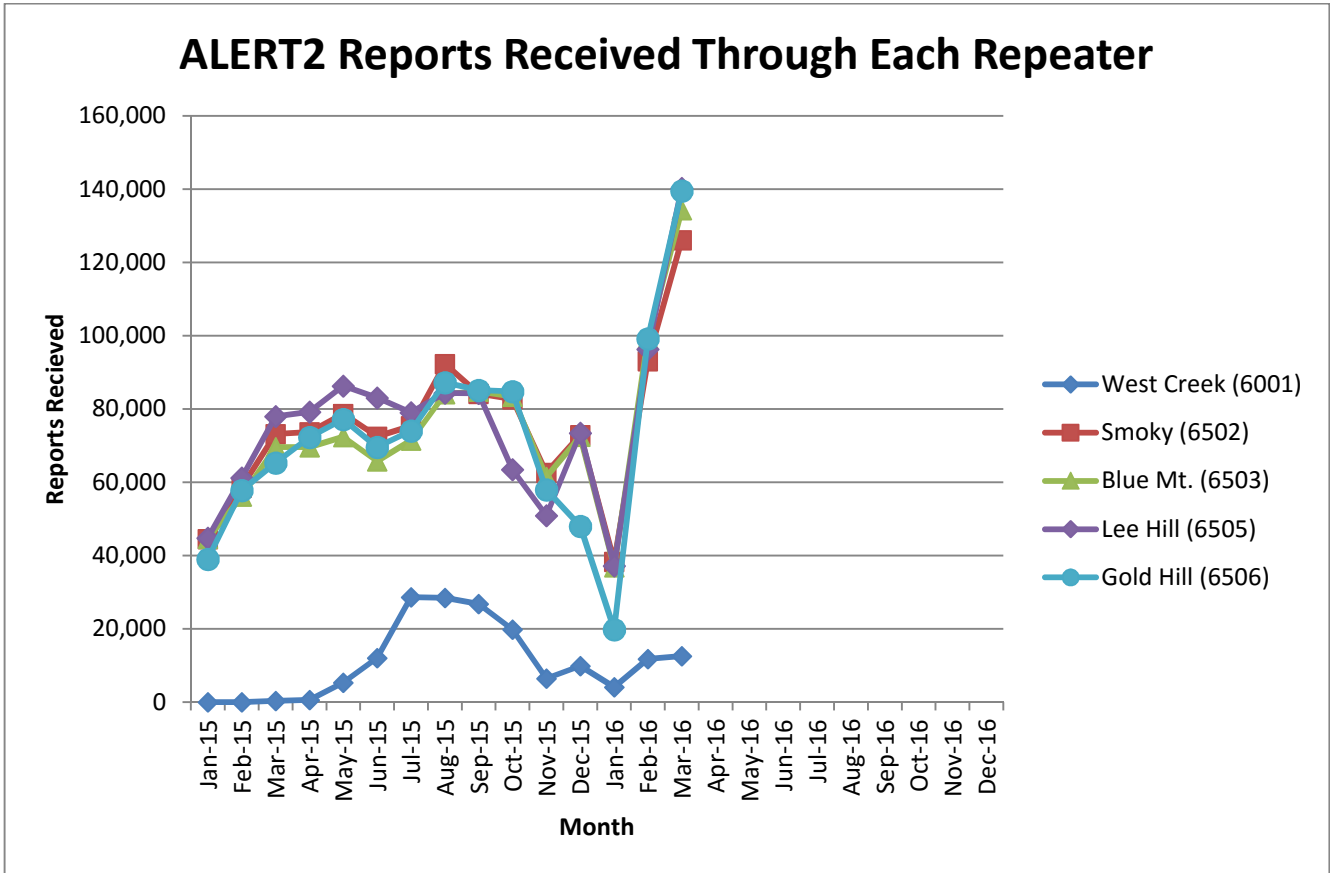


Figure 2. Reports received through each repeater (ALERT2 Only)

In general each of the primary repeaters in the District process an equivalent number of ALERT2 reports. Several months are evident where the throughput of one repeater is not consistent with the other three. The reduction of ALERT2 reports through Lee Hill in October is evident (Figure 2) as is the reduction of ALERT2 reports through Gold Hill in December. A convenient mechanism to track repeater performance throughout the year is to monitor total ALERT2 reports passed by each repeater.

The following tables summarize the system-wide latency of ALERT2 self-reports (Table 7 and Table 8).

Table 7. System-Wide Latency of ALERT2 Self-Reports (seconds)

Statistical Parameter	Value (sec)	Comments
Mean	75.36	The average time it took a report from the field to reach the base
Minimum	1.0	The minimum time it took for a report to go from the field to the base
Maximum	521	The maximum time it took for a report to go from the field to the base
Crazy	2,887	Exceedingly large latency

Table 8. Summary of ALERT2 System-Wide Latency (seconds)

Statistical Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	66.17	72.6	75.36									
Minimum	3	2	1									
Maximum	300	261	521									
Station with Max Latency	Magnolia WX (6602)	Magnolia WX (6607)	Sand Cr (10016)									
Station with Crazy Latency		Trumbull WX – Hayman (100260)	Magnolia WX (6607)									

The large latency of 2,887 seconds from the Magnolia WX (SA 6607) weather station occurred on March 3rd. The ALERT2 transaction logs are shown below. The ALERT2 packet was received by the decoder at 9:04:49 and the packet was created at the remote site at 9:02:44. The data value was not written to the database until 9:50:50. The ALERT data collection had also timed out. Looking through additional logs indicates the NovaStar5 database was hung for a period and that is the reason data was not filed until 9:50.

```
Mar 3 09:50:50 udfcd-ns5a nsreodata[4595]: Line: 4 SA: 6601 Time: 03/03/2016 09:50:50 AIRLINK TS=03/03/2016 16:04:49.245094 UTC
Mar 3 09:50:50 udfcd-ns5a nsreodata[4595]: Line: 4 SA: 6601,6505 Time: 03/03/2016 09:02:44 ID: 6602 Data: 41 Scaled: 4.1 Action: insert
```

The Sand Creek (10016) time lag of 521 seconds occurred on March 14th around 2:54 PM. The ALERT2 log file entries are shown below. The ALERT2 airlink packet was received at the decoder at 3:02 PM and the data was written to the database at 3:02 PM but the report time in the data packet was 2:54 PM.....so approximately 8 minutes had elapsed since the data was recorded and written to the database. Since the packet was received at 3:02 and written to the database at 3:02 the time lag was upstream of the ALERT2 decoder. Possibly a problem at the transmitter since all four repeaters showed the same behavior.

```
Mar 14 15:03:02 udfcd-ns5a nsreodata[4144]: Line: 4 SA: 6601 Time: 03/14/2016 15:03:02 AIRLINK TS=03/14/2016 21:03:02.230546 UTC Length=62
Mar 14 15:03:02 udfcd-ns5a nsreodata[4144]: Line: 4 SA: 10016,6502 Time: 03/14/2016 14:54:31 ID: 100167 Data: 0.70 Scaled: 0.18 Action: insert
Mar 14 15:03:05 udfcd-ns5a nsreodata[4144]: Line: 4 SA: 6601 Time: 03/14/2016 15:03:05 AIRLINK TS=03/14/2016 21:03:05.151494 UTC Length=62
Mar 14 15:03:05 udfcd-ns5a nsreodata[4144]: Line: 4 SA: 10016,6503 Time: 03/14/2016 14:54:31 ID: 100167 Data: 0.70 Scaled: 0.18 Action: repeat ignore
Mar 14 15:03:09 udfcd-ns5a nsreodata[4144]: Line: 4 SA: 10016 Time: 03/14/2016 15:03:09 AIRLINK TS=03/14/2016 21:03:09.242716 UTC Length=2
Mar 14 15:03:09 udfcd-ns5a nsreodata[4144]: Line: 4 SA: 10016,6505 Time: 03/14/2016 14:54:31 ID: 100167 Data: 0.70 Scaled: 0.18 Action: repeat ignore
Mar 14 15:03:12 udfcd-ns5a nsreodata[4144]: Line: 4 SA: 10016 Time: 03/14/2016 15:03:12 AIRLINK TS=03/14/2016 21:03:12.120872 UTC Length=20
Mar 14 15:03:12 udfcd-ns5a nsreodata[4144]: Line: 4 SA: 10016,6506 Time: 03/14/2016 14:54:31 ID: 100167 Data: 0.70 Scaled: 0.18 Action: repeat ignore
```

Another interesting example of latency is provided by the following. The log files are not identical between Diamond Hill and Greenhouse. The large latency is present only on the data collection at the Greenhouse server. Likely latency induced by a network problem at Greenhouse.

Diamond Hill – Novastar5

Mar 7 16:35:25 udfcd-ns5a nsrecdata[26897]: Line: 4 SA: 10028 Time: 03/07/2016 16:35:25 AIRLINK TS=03/07/2016 23:35:25.156483 UTC

Mar 7 16:35:25 udfcd-ns5a nsrecdata[26897]: Line: 4 SA: 10028,6503 Time: 03/07/2016 16:34:00 ID: 1421 Data: 57 Scaled: 57 Action: insert

Mar 7 16:35:29 udfcd-ns5a nsrecdata[26897]: Line: 4 SA: 10028 Time: 03/07/2016 16:35:29 AIRLINK TS=03/07/2016 23:35:29.237018 UTC

Mar 7 16:35:29 udfcd-ns5a nsrecdata[26897]: Line: 4 SA: 10028,6505 Time: 03/07/2016 16:34:00 ID: 1421 Data: 57 Scaled: 57 Action: repeat ignore

Mar 7 16:35:32 udfcd-ns5a nsrecdata[26897]: Line: 4 SA: 10028 Time: 03/07/2016 16:35:32 AIRLINK TS=03/07/2016 23:35:32.125052 UTC

Mar 7 16:35:32 udfcd-ns5a nsrecdata[26897]: Line: 4 SA: 10028,6506 Time: 03/07/2016 16:34:00 ID: 1421 Data: 57 Scaled: 57 Action: repeat ignore

Mar 7 16:35:42 udfcd-ns5a nsrecdata[26897]: Line: 4 SA: 10028 Time: 03/07/2016 16:35:42 AIRLINK TS=03/07/2016 23:35:42.239334 UTC

Mar 7 16:35:42 udfcd-ns5a nsrecdata[26897]: Line: 4 SA: 10028,6502 Time: 03/07/2016 16:34:00 ID: 1421 Data: 57 Scaled: 57 Action: repeat ignore

Greenhouse – Novastar5

Mar 7 16:35:25 udfcd-ns5b nsrecdata[11879]: Line: 4 SA: 10028 Time: 03/07/2016 16:35:25 AIRLINK TS=03/07/2016 23:35:25.156483 UTC

Mar 7 16:35:26 udfcd-ns5b nsrecdata[11879]: Line: 4 SA: 10028,6503 Time: 03/07/2016 16:34:00 ID: 1421 Data: 57 Scaled: 57 Action: insert

Mar 7 16:35:29 udfcd-ns5b nsrecdata[11879]: Line: 4 SA: 10028 Time: 03/07/2016 16:35:29 AIRLINK TS=03/07/2016 23:35:29.237018 UTC

Mar 7 16:35:30 udfcd-ns5b nsrecdata[11879]: Line: 4 SA: 10028,6505 Time: 03/07/2016 16:34:00 ID: 1421 Data: 57 Scaled: 57 Action: repeat ignore

Mar 7 16:35:32 udfcd-ns5b nsrecdata[11879]: Line: 4 SA: 10028 Time: 03/07/2016 16:35:32 AIRLINK TS=03/07/2016 23:35:32.125052 UTC

Mar 7 17:17:37 udfcd-ns5b nsrecdata[11879]: Line: 4 SA: 10028,6506 Time: 03/07/2016 16:34:00 ID: 1421 Data: 57 Scaled: 57 Action: repeat ignore

Mar 7 17:17:38 udfcd-ns5b nsrecdata[11879]: Line: 4 SA: 10028 Time: 03/07/2016 17:17:38 AIRLINK TS=03/07/2016 23:35:42.239334 UTC

Mar 7 17:17:38 udfcd-ns5b nsrecdata[11879]: Line: 4 SA: 10028,6502 Time: 03/07/2016 16:34:00 ID: 1421 Data: 57 Scaled: 57 Action: repeat ignore

E. TDMA Time Slot Size

ALERT2 networks will have problems with missing timed station reports when they have transmit times at some stations that exceeded the TDMA slot size. For example, a test transmission from a site will be received when it's sent manually from the site but the timed transmissions are not received. This is a problem with the station preceding the missing station in the TDMA assignment.

A program is written for the UDFCD that checks the receive data log files looking for station reports that are too long. For example, when you look at lines with MANT TS=... the Length=# is the data packet size. It should not be more than 45 bytes.

The following stations exceeded the allowable 0.5ms time slot.

This aspect of the analysis report will be developed and included in next month's analysis.

F. Inefficient ALERT2 Packets

An inefficient ALERT2 packet contains a single (MANT) data packet per air link packet. ALERT2 supports the composition of air link packets containing multiple data packets. Using a single air link packet for each data packet is an efficient use of the ALERT2 protocol and should be avoided. The following sites were identified as possibly being configured inefficiently:

-) Newlin Gulch (3070) – Campbell Scientific
-) Trumbull Fire Station Weather (10026) - HydroLynx
-) Side Creek Park (10033)
-) Broadway (10031)
-) OneRain Weather (10020)

G. Rain Sensor Timer Reporting Summary

The following analysis assumes that each legacy rain sensor has a 12-hour timer-reporting interval and each A2 rain sensor has a 1-hour timer-reporting interval. The worst performing rain sensors for the month are summarized (Table 9).

Table 9. Monthly Summary of Sensors with Poor Timer Performance (Sensor ID)

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
10026	3020	4470									
4550	4520	2790									
2330	2790	4850									
4270	4850	5940									
1660	10026	10023									
4330	10020	10026									

*- Only sensors that operate year-round (weather stations and stations in Boulder County) are included for the analysis in these months.

Sensors identified as having poor timer performance in multiple months are shaded with unique colors. A developing trend can thus be identified from the color shading as the year progresses.

III. Rain Sensor Event Reporting Summary

A. District-Wide Total Tip/Count Statistics

The incrementing reports from all 1-mm rain sensors were analyzed to quantify the District-wide statistical total monthly tip summary (Table 10). For the months of January, February, March, October, November and December only the stations that operate year-round are included in the rain event analysis. These stations include all weather stations and the stations in Boulder County.

Table 10. District-Wide Total Tip/Count Statistical Summary

Statistical Parameter	Value	Comments
Mean	32.3	Only the 1-mm rain sensors were included in the analysis
Median	28	Only the 1-mm rain sensors were included in the analysis
Standard deviation	17.9	Only the 1-mm rain sensors were included in the analysis
Mean plus three standard deviations	86	Only the 1-mm rain sensors were included in the analysis
Mean minus two standard deviations	--	Only the 1-mm rain sensors were included in the analysis
Minimum total count	4	Elbert WX (1440)
Maximum total count	87	Justice Center (4360)
Sensors showing NO rain for the month		--
Sensors greater than 3 SD (over reporting)	1	Justice Center (4360)

B. Monthly Average Tip/Count Summary

A monthly summary of the District-wide mean total tip/count is presented (Table 11).

Table 11. Monthly Summary of District-Wide Mean Total 1-mm Tip/Count

Year	Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*	Ave
2006	4.62	5.92	18.39	20.47	19.44	13.75	74.03	46.89	24.17	41.13	5.04	16.45	24.19
2007	11.56	5.40	29.75	65.03	68.30	15.87	36.20	46.38	22.13	29.50	6.54	11.29	29.00
2008	4.05	7.38	12.26	20.57	54.82	26.06	16.43	90.20	37.54	19.59	2.82	9.24	25.08
2009	6.33	3.11	11.37	59.26	63.45	68.00	65.00	20.00	27.29	30.24	11.00	5.60	30.89
2010	5.97	11.90	32.54	70.57	39.63	56.04	50.23	31.01	4.18	18.31	8.30	3.31	27.67
2011	6.78	7.45	7.54	33.94	92.68	39.42	90.87	18.25	37.67	25.73	10.41	13.59	32.03
2012	4.89	13.57	2.35	30.17	38.97	19.35	73.03	11.31	48.81	22.32	2.98	4.18	22.66
2013	2.96	14.31	21.86	35.96	45.87	16.39	52.33	50.63	229.74	29.64	5.86	4.00	42.46
2014	6.88	11.86	25.91	29.30	77.30	29.16	99.73	43.59	50.96	29.26	13.36	8.11	35.45
2015	9.88	24.42	20.78	69.75	143.07	86.93	54.59	29.95	7.16	53.28	22.08	10.80	44.39
2016	4.68	9.91	32.30										

*- Only sensors that operate year-round (weather stations and stations in Boulder County) are included for the analysis in these months.

C. Sensors with a Jump of Six or More in the Sequential Count

Several sensors experienced a large jump in the sequential tip count (Table 12).

Table 12. Sensors with a Jump of 6 or More in Sequential Count

Sensor Description	Sensor ID	Comment
Wx-West Cherry Creek	2790	Several large jumpspossible due to a deteriorating antenna at West Creek
Wx-Tomah Road	2990	Several large jumpspossible due to a deteriorating antenna at West Creek

D. Sensor-by-Sensor Incrementing Count Summary

The system-wide reception rate of incrementing, 1-mm tip reports for the month was approximately 95 percent. A total of 2,044 incrementing reports were received and a total of 2,162 reports were expected. The total loss of incrementing reports for the month was approximately 5 percent. Those sensors with the worst event transmission performance are summarized (Table 13).

Table 13. Monthly Summary of Sensors with the Worst Performance

Jan*	Feb*	Mar*	Apr	May	Jun	Jul	Aug	Sep	Oct*	Nov*	Dec*
1530	4270	2790									
4550	10026	10026									
1640	2790	5940									
4180	4240	4790									
1660	5940	4510									
4840	4510	4870									

*-Only sensors that are operational year-round (weather stations and stations in Boulder County) are included for the analysis in these months.

Sensors identified as having poor event performance in multiple months are shaded with unique colors. A developing trend can thus be identified from the color shading as the year progresses.

IV. Unknown Device Analysis – Received Data Log

The ALERT IDs present in the audio signal received by the decoder are compared against a list of “active” device IDs that are defined within NovaStar. Those IDs received by the decoder that are not defined within NovaStar are considered to be “unknown” and may be the result of radio noise or problems with the telemetry system. The reception of “unknown” device reports for the month is summarized (Table 14).

Table 14. Summary of Unknown IDs

Description	Concentrator	Legacy	A2
Total number of unknown IDs (IDs without a device definition)	408	395	0
Total reports from unknown IDs	3,085	2,878	0
Unknown IDs with only a single received report (potential noise)	204	225	0
Total reports from all IDs – RecData Log entire month	446,510	263,959	552,747
Unknown reports as a fraction of total reports	0.69%	1.09%	0%

The total number of reports from unknown sensors is very small relative to the total reports received for the month. Shown below (Table 15) are the total reports received from unknown sensor IDs for each month of the year.

Table 15. Monthly Summary of Total Reports from Unknown IDs (Concentrator)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	1,220	1,474	1,276	1,174	721	5,707	610	1,738	442	533	2,857	6,396
2011	1,231	2,165	3,065	1,254	2,051	439	489	456	191	683	747	861
2012	692	750	1,575	977	5,469	11,016	453	683	774	2,657	3,854	5,466
2013	4,265	994	1,100	2,589	3,623	6,973	5,230	1,070	4,429	781	13,459	1,213
2014	870	4,284	2,399	2,104	25,746	1,832	3,983	268	369	448	470	1,099
2015	542	9,137	1,524	1,007	946	699	1,179	1,860	1,153	1,063	600	619
2016	323	1,241	3,085									

The fraction of reports from unknown sensors relative to the total number of reports is shown below (Table 16).

Table 16. Monthly Percent of Unknown Sensor Reports (Concentrator)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2010	0.42%	0.56%	0.38%	0.32%	0.20%	1.61%	0.17%	0.49%	0.13%	0.16%	0.93%	1.88%
2011	0.39%	0.73%	0.90%	0.37%	0.58%	0.12%	0.12%	0.05%	0.12%	0.18%	0.22%	0.26%
2012	0.30%	0.25%	0.43%	0.26%	1.37%	2.74%	0.11%	0.18%	0.20%	0.72%	1.15%	1.62%
2013	1.40%	0.31%	0.29%	0.60%	0.37%	0.61%	0.82%	0.21%	0.96%	0.31%	5.37%	0.23%
2014	0.14%	0.94%	0.40%	0.34%	3.95%	0.34%	0.66%	0.03%	0.03%	0.07%	0.11%	0.26%
2015	0.15%	2.25%	0.34%	0.22%	0.19%	0.14%	0.26%	0.42%	0.29%	0.24%	0.15%	0.15%
2016	0.10%	0.30%	0.69%									

Any month shaded in yellow has an excessive number of reports from unknown sensors.

A number of “unknown” sensors had multiple reports, which may indicate the existence of a transmitter that is sending information on an ID that is not currently defined within NovaStar. The unknown IDs with multiple reports including the number of reports received by each are shown (Table 17).

Table 17. Reports Received by Unknown IDs

Concentrator		Legacy ALERT		Comment
Unknown ID	Reports	Unknown ID	Reports	
2274	309	2274	309	From Cub Creek below Blue (2270)
2272	199	2272	199	From Cub Creek below Blue (2270)
2271	195	2271	195	From Cub Creek below Blue (2270)
623	166	623	166	
722	134	722	134	From Confluence Pond (720)
721	134	727	134	From Confluence Pond (720)

V. Sensors with Invalid Reports

The sensors below (Table 18 and Table 19) have the largest number of invalid decodes as determined by the validation process defined at the District NovaStar5 base station. These invalid reports may indicate poor radio paths (bit flip/contention errors/random decode) or validation criteria that do not match the physical installation at the site.

Table 18. Rain Sensors with the Most Invalid Reports

Sensor ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1530-Bear Cr. At Lowell	8	5	10									
2810-Pine Cliff Rd.	--	18	11									
2750-Wx-Castle Rock	10	24	0									
2990-Tomah Rd.	--	12	2									
3010-Wx-EPC @ 105	--	--	8									
3020-Wx-West Creek	9	103	96									
3050-E/W Trailhead	--	--	8									
3070-Newlin Gulch	10	52	5									
4030-Red Garden	23	41	3									

The antenna system at the West Creek repeater is deteriorating and will require maintenance as soon as WET can travel up to the repeater this spring. The likely cause of the poor performance of many Douglas County sites is the deteriorating antenna system at West Creek.

Table 19. Level Sensors with the Most Invalid Reports

Sensor ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
203-Leyden Res	11	22	37									
413-Kelly Dam	--	70	2									
723-WTG ab Conf Pond	--	--	66									
853-Flying J	--	36	57									
1383-Ferril Lake	747	703	686									
1203-Brmfld/Pond6	--	--	261									
1803-Sand Cr Park	--	9	0									
2273-Cub Cr bl Blue	--	--	37									
2873-Cottonwood	--	--	85									
2883-Happy Canyon	--	--	62									
3013-EPC@Hwy 105	7	19	11									
3043-CC@Russelville	--	--	22									
4563-Lyons Diversion	--	13	13									

VI. Rainfall Alarms and Intensity Analysis

The following rainfall rate alarms from the Urban Drainage and Flood Control District NovaStar 5.0 Web Server were identified this month.

There were no rainfall alarms this month.

General System Analysis

Database Name P:\A207-UDFCD-Data-Analysis\2016\03-2016\Novastar_extract_2016Mar.mdb

First Date in Database	2/29/16 11:59 PM	Total Days	31.0
Last Date in Database	3/31/16 11:59 PM	Total Hours	744.0

Summarize

Total Records Analyzed 446,510

Records by Group	Concentrator	Percent	Legacy	Percent	ALERT2	Percent
Wind Data	186,365	41.7%	100,245	38.0%	223,038	40.4%
Temperature	70,935	15.9%	35,352	13.4%	81,002	14.7%
Relative Humidity	61,744	13.8%	35,623	13.5%	79,732	14.4%
Barometric Pressure	34,386	7.7%	20,975	7.9%	452	0.1%
Battery Voltage	26,136	5.9%	12,034	4.6%	46,433	8.4%
Water Level	19,537	4.4%	16,135	6.1%	31,667	5.7%
Precipitation	13,031	2.9%	10,568	4.0%	23,400	4.2%
Solar Radiation	11,119	2.5%	10,792	4.1%	0	0.0%
Dew Point Temperature	0	0.0%	0	0.0%	8,806	1.6%
Fuel Temperature	5,931	1.3%	5,842	2.2%	0	0.0%
Fuel Moisture	5,921	1.3%	5,805	2.2%	0	0.0%
Unknown	3,085	0.7%	2,878	1.1%	44	0.0%
Soil Moisture	2,976	0.7%	2,935	1.1%	0	0.0%
Repeater Status Report	2,334	0.5%	2,926	1.1%	0	0.0%
Flasher Status	0	0.0%	0	0.0%	1,751	0.3%
Wind Direction	1,290	0.3%	1	0.0%	35,856	6.5%
ET-Hourly	733	0.2%	719	0.3%	0	0.0%
GPS Lock	211	0.0%	124	0.0%	20,082	3.6%
12Hr Status Report	208	0.0%	190	0.1%	334	0.1%
Hayman Battery	200	0.0%	91	0.0%	0	0.0%
Water Temp	125	0.0%	0	0.0%	0	0.0%
Handar 585 ALARM Status	70	0.0%	68	0.0%	0	0.0%
Repeater Pass List	63	0.0%	553	0.2%	0	0.0%
Not Used	59	0.0%	52	0.0%	150	0.0%
ET-Daily	30	0.0%	30	0.0%	0	0.0%
Solar Power	19	0.0%	19	0.0%	0	0.0%
ALERT/A2 Testing	1	0.0%	1	0.0%	0	0.0%
Longmont Water Level PT	1	0.0%	1	0.0%	0	0.0%
Total	446,510	100.0%	263,959	100.0%	552,747	100.0%

Traffic Loading Summary	Concentrator		Legacy		ALERT2	
Alert Reports	446,510		263,959		552,747	
Average Daily Traffic	13,953		8,515		17,273	
Average Hourly Traffic	581		355		720	
Median Hourly Traffic	580	hour beginning	346	hour beginning	740	hour beginning
Peak Hourly Traffic	940	Mar 24, 12:00 PM	668	Mar 24, 12:00 PM	910	Mar 31, 11:00 AM
2nd Max	915	Mar 24, 11:00 AM	639	Mar 24, 11:00 AM	880	Mar 25, 2:00 PM
3rd Max	900	Mar 24, 1:00 PM	586	Mar 24, 1:00 PM	870	Mar 31, 1:00 PM
4th Max	890	Mar 7, 12:00 PM	532	Mar 7, 12:00 PM	869	Mar 31, 12:00 PM
5th Max	861	Mar 14, 1:00 PM	529	Mar 27, 12:00 AM	866	Mar 29, 12:00 PM

Rain Timer Performance

Analyze Rain Sensors

Rain Sensors	Description	Rcv	Timer	Exp	Performance
4470	Little Narrows	8	22:00	64	13%
2790	Wx-W. Cherry Creek	10	9:26	64	16%
4850	Porphory Mtn	24	2:34	64	38%
5940	Log Jumper	31	21:43	64	48%
100230	A2-Havana Pond Precip	397		744	53%
100260	Wx-A2-Trumbull (Hayman) - Precip	405		744	54%
4510	Pinewood Springs	35	18:12	64	55%
4270	Cannon Mountain	36	16:51	64	56%
100160	A2-Sand Creek at Colfax Precip	419		744	56%
2750	Wx-Castle Rock	37	14:22	64	58%
3010	WX-EPC at Hwy 105	43	13:52	64	67%
4870	SBC @ SB Road	43	16:41	64	67%
4790	Wx-Button Rock	50	14:35	64	78%
4330	Hansen Rain	50	14:48	64	78%
4080	Twin Sisters	50	13:59	64	78%
4050	Walker Ranch	50	13:48	64	78%
2930	Wx-Spring Valley Rd-DougCnty	51	14:54	64	80%
4360	Justice Center	51	14:15	64	80%
4300	Big Elk Park	51	12:13	64	80%
2710	Wx-Highlands Ranch WTP	52	13:58	64	81%
4350	Conifer Hill	52	13:40	64	81%
4220	Fling's	52	14:08	64	81%
4190	Slaughterhouse	52	13:57	64	81%
4710	Wx-Ward C-1	53	13:36	64	83%
1460	Wx-Urban Farm	53	14:12	64	83%
1520	Wx-Marston Lake North	53	14:01	64	83%
4750	Wx-Louisville Lake	53	13:23	64	83%
1440	Wx-Elbert	53	13:58	64	83%
4770	Wx-Cal-Wood Ranch	53	14:09	64	83%
920	Wx-Aurora Town Hall	53	13:31	64	83%
4570	St. Antons	53	14:28	64	83%
4550	Boulder Jail	53	14:26	64	83%
4490	Apple Valley	53	12:31	64	83%
4180	Gold Lake	53	13:34	64	83%
4110	Betasso	53	14:18	64	83%
4100	Filter Plant	53	14:18	64	83%
4090	Magnolia	53	14:13	64	83%
4060	Lakeshore	53	13:52	64	83%
4030	Red Garden	53	14:15	64	83%
2730	Wx-Salisbury Park	54	13:48	64	84%
1920	Wx-Brighton	54	13:23	64	84%
140	Wx-Blue Mountain	54	13:33	64	84%
4530	Winiger Ridge	54	13:55	64	84%
4860	Fairview Peak	54	13:29	64	84%
4340	Riverside	54	13:20	64	84%
4320	Lee Hill Rain 2012	54	13:44	64	84%
4310	Johnny Park	54	13:59	64	84%
4260	Taylor Mountain	54	13:31	64	84%
4250	Geer Canyon	54	13:49	64	84%
4020	Rio Grande	54	13:46	64	84%
4010	Crescent	54	14:01	64	84%
4730	Wx-Sugarloaf	55	13:44	64	86%
900	Wx-Aurora Reservoir	55	13:21	64	86%
100200	A2-OneRain Weather - Precipitation	55	13:55	64	86%

4840	SBC@S Boulder Ditch	55	13:53	64	86%
4830	SBC @ San Souci	55	13:30	64	86%
4290	Red Hill	55	13:31	64	86%
4200	Lazy Acres	55	13:37	64	86%
4070	Bear Peak	55	13:22	64	86%
4040	Martin Gulch	55	13:43	64	86%
1570	Wx-Brighton Ditch	56	13:29	64	88%
4820	Doudy Draw	56	13:22	64	88%
4810	Shanahan Ridge	56	14:02	64	88%
4230	Golden Age	56	13:08	64	88%
4170	Pine Brook	56	13:22	64	88%
4160	Sunshine	56	13:15	64	88%
4140	Logan Mill	56	13:15	64	88%
100290	Wx-A2-PlumCr at Sedalia - Precip	654		744	88%
2990	Wx-Tomah Rd-DougCnty	57	13:04	64	89%
750	Wx-Quincy Reservoir	57	13:08	64	89%
2210	Wx-Hiwan G.C.	57	12:57	64	89%
3030	WX-Bingham Lake Park	57	13:11	64	89%
4880	Whispering Pines	57	13:14	64	89%
4240	Sunset	57	13:08	64	89%
4150	Gold Hill	57	13:01	64	89%
4130	Swiss Peaks	57	13:02	64	89%
100300	A2-CoalCreek at McCaslin - Precip	674		744	91%
100240	A2-Westerly Cr Dam Precip	676		744	91%
6601	A2-Magnolia WX-Precip	82	9:03	87	94%
100320	A2-Weir Gulch - Precip	64	0:57	64	100%
3090	A2-Highland Heritage Park	213		744	29%
3080	Tallman Gulch	19	11:48	64	30%
3070	A2-Newlin Gulch Precip	244		744	33%
3060	Fire Sta 47	18	11:17	64	28%
3050	East/West Trailhead	36	14:21	64	56%
3040	CC @ Russelville Road Precip	34	15:43	64	53%
2980	Dakan Rd	39	17:50	64	61%
2970	Rampart Range Rd-Satellite	159		159	100%
2960	Indian Creek	35	15:35	64	55%
2950	DC Public Works	41	14:12	64	64%
2940	Willow Creek - DougCnty	41	14:39	64	64%
2920	West Cherry Head-Douglas Cnty	37	14:21	64	58%
2910	East Cherry Cr-Douglas	38	14:49	64	59%
2900	Russelville Gulch-Douglas	36	16:10	64	56%
2890	Spruce Mt - Douglas	39	13:50	64	61%
2880	Happy Canyon at N Surrey Dr	36	14:34	64	56%
2870	Cottonwood (Apache)	20	11:57	64	31%
2860	CC at Stroh Rd	21	10:07	64	33%
2850	Cherry Cr bl Bayou Glch	18	11:57	64	28%
2840	Sulphur Gulch	19	12:00	64	30%
2820	Haskins Gulch Conf	41	13:31	64	64%
2810	Pine Cliff Road	37	6:02	64	58%
2370	Red Rocks Park	42	14:08	64	66%
2360	Indian Hills	3	11:58	64	5%
2350	Idledale	3	11:57	64	5%
2340	El Rancho	3	11:57	64	5%
2330	Morrison	39	16:35	64	61%
2320	Choke Cherry Resvr	44	13:55	64	69%
2310	Genesee Village	5	11:58	64	8%
2280	Kinney Peak	4	11:57	64	6%
2270	Cub Cr below Blue	7	7:10	64	11%
2260	Brook Forest	4	11:58	64	6%

2250	Rosedale	5	11:57	64	8%
2240	Cold Sprg Glch conf	4	11:58	64	6%
2230	Bear Cr below Cub	4	17:57	64	6%
1900	Niver Detention	53	14:13	64	83%
1800	Sand Creek Park	54	13:46	64	84%
1720	Cherry Cr @ Steele	33	11:57	64	52%
1710	Shop Creek	35	17:48	64	55%
1700	Cherry Cr @ Champa	54	13:34	64	84%
1660	SPR at Henderson	47	14:39	64	73%
1640	SPR at Union Ave.	50	14:05	64	78%
1620	Slaughterhouse Glch	2		64	3%
1600	Englewood Dam	1		64	
1550	Lakewood CC	53	13:31	64	83%
1530	Bear Creek @ Lowell	3	23:54	64	5%
1500	Powers Park	30	13:13	64	47%
1420	A2-Wx-Diamond Hill	4	12:00	64	6%
1400	Upper Sloan Det.	51	14:02	64	80%
1370	West Metro FS13	39	14:45	64	61%
1360	Denver Zoo	32	19:32	64	50%
1350	Chatfield COE	50	14:43	64	78%
1340	Sanderson at Xavier	36	11:58	64	56%
1320	SPR at 3rd Ave	52	13:44	64	81%
1310	LDC at 64th	54	13:47	64	84%
1300	Hidden Lake	54	13:29	64	84%
1200	Broomfield 3207	28	8:22	64	44%
1110	Gunbarrel	21	11:58	64	33%
1100	Louisville Rec Ctr	23	11:59	64	36%
1060	Heritage Square	56	13:28	64	88%
1050	Jeffco Fairgrounds	55	13:28	64	86%
1040	Lena @ U.S. Hwy 6	8	0:01	64	13%
1030	NREL/S. Table Mtn.	55	13:35	64	86%
1010	Denver West	49	14:30	64	77%
1000	A2-Maple Grove Resv.	676		744	91%
970	Pump Sta 3	57	13:10	64	89%
950	Piney at Liverpool	34	6:44	64	53%
940	Aurora Regional Pond	58	12:28	64	91%
870	A2-Murphy Creek GC	663		744	89%
850	Flying J	56	13:16	64	88%
840	Fire Station 12	55	13:27	64	86%
820	ETG @ Buckley	18	12:49	64	28%
810	Granby Ditch @ 6th	55	13:30	64	86%
800	Sable Ditch @ 18th	57	13:14	64	89%
760	Mission Viejo Park	56	13:30	64	88%
720	Confluence Pond	83	8:36	64	130%
710	Horseshoe Park Drop	20	11:58	64	31%
700	Toll Gate @ 6th	48	14:52	64	75%
650	Iliff Pond	13	0:00	64	20%
640	Goldsmith @ Eastman	36	9:12	64	56%
630	Temple Pond at DTC	35	10:03	64	55%
620	Quincy/Highline	52	14:12	64	81%
610	Harvard @ Jackson	35	12:23	64	55%
600	Harvard Gulch Park	34	11:58	64	53%
540	Parker/Mississippi	53	14:09	64	83%
530	Fire Station #19	55	13:35	64	86%
520	Jewell Detention	55	11:57	64	86%
510	Virginia Court	55	13:32	64	86%
500	Havana Park	53	13:59	64	83%
440	Fire Station #7	55	13:01	64	86%
430	Utah Park	4	23:56	64	6%
420	Expo Park	54	13:48	64	84%

410	Kelly Dam	55	13:46	64	86%
330	Van Bibber @ Hwy 93	55	12:53	64	86%
320	Sports Complex	51	13:31	64	80%
310	Guy Hill Ranch	55	13:20	64	86%
300	Van Bibber Park	55	13:29	64	86%
220	Upper Leyden	56	13:35	64	88%
210	Leyden Confluence	50	13:44	64	78%
200	Leyden Reservoir	56	13:26	64	88%
150	Nott Creek	53	13:49	64	83%
110	Ralston Reservoir	60	12:13	64	94%
100	A2-Carr Street	640		744	86%
100150	A2-Sellers Gulch at Haystack Precip	13	12:59	64	20%
100140	A2-Upper Sellers Gulch Precip	13	12:59	64	20%
100110	A2-ETG @ Hampden Precip	2		744	0%
100100	A2-Blackstone Precip	1		744	0%

Golden Age	4230	100%	12	0	0	0	0	0	0	12	12	0	0	0.03937
Slaughterhouse	4190	100%	21	0	0	0	0	0	0	21	21	0	0	0.03937
Gold Lake	4180	100%	28	0	0	0	0	0	0	28	28	0	0	0.03937
Pine Brook	4170	100%	42	0	0	0	0	0	0	42	42	0	0	0.03937
Gold Hill	4150	100%	30	0	0	0	0	0	0	30	30	0	0	0.03937
Logan Mill	4140	100%	26	0	0	0	0	0	0	26	26	0	0	0.03937
Swiss Peaks	4130	100%	31	0	0	0	0	0	0	31	31	0	0	0.03937
Betasso	4110	100%	59	0	0	0	0	0	0	59	59	0	0	0.03937
Magnolia	4090	100%	29	0	0	0	0	0	0	29	29	0	0	0.03937
Twin Sisters	4080	100%	16	0	0	0	0	0	0	16	16	0	0	0.03937
Rio Grande	4020	100%	26	0	0	0	0	0	0	26	26	0	0	0.03937
			1965	70	4	3	1	0	5	2044	2162	91	0	
A2-Highland Heritage Park	3090	100%	17	0	0	0	0	0	0	17	17	0	0	0.03937
Tallman Gulch	3080	100%	12	0	0	0	0	0	0	12	12	0	0	0.03937
A2-Newlin Gulch Precip	3070	100%	8	0	0	0	0	0	0	8	8	0	0	0.03937
Fire Sta 47	3060	100%	11	0	0	0	0	0	0	11	11	0	0	0.03937
East/West Trailhead	3050	100%	17	0	0	0	0	0	0	17	17	0	0	0.03937
CC @ Russelville Road Precip	3040	100%	20	0	0	0	0	0	0	20	20	0	0	0.03937
Dakan Rd	2980	84%	25	6	0	0	0	0	0	31	37	6	0	0.03937
Rampart Range Rd-Satellite	2970	100%	35	0	0	0	0	0	0	35	35	0	0	0.03937
Indian Creek	2960	100%	30	0	0	0	0	0	0	30	30	0	0	0.03937
DC Public Works	2950	100%	22	0	0	0	0	0	0	22	22	0	0	0.03937
Willow Creek - DougCnty	2940	100%	22	0	0	0	0	0	0	22	22	0	0	0.03937
West Cherry Head-Douglas Cnty	2920	91%	9	1	0	0	0	0	0	10	11	1	0	0.03937
East Cherry Cr-Douglas	2910	100%	14	0	0	0	0	0	0	14	14	0	0	0.03937
Russelville Gulch-Douglas	2900	96%	23	1	0	0	0	0	0	24	25	1	0	0.03937
Spruce Mt - Douglas	2890	100%	9	0	0	0	0	0	0	9	9	0	0	0.03937
Happy Canyon at N Surrey Dr	2880	95%	20	1	0	0	0	0	0	21	22	1	0	0.03937
Cottonwood (Apache)	2870	80%	7	0	1	0	0	0	0	8	10	2	0	0.03937
CC at Stroh Rd	2860	100%	15	0	0	0	0	0	0	15	15	0	0	0.03937
Cherry Cr bl Bayou Glch	2850	93%	12	1	0	0	0	0	0	13	14	1	0	0.03937
Sulphur Gulch	2840	92%	10	1	0	0	0	0	0	11	12	1	0	0.03937
Haskins Gulch Conf	2820	93%	24	2	0	0	0	0	0	26	28	2	0	0.03937
Pine Cliff Road	2810	100%	4	0	0	0	0	0	2	4	4	0	0	0.03937
Red Rocks Park	2370	90%	43	3	1	0	0	0	0	47	52	5	0	0.03937
Indian Hills	2360	82%	8	0	1	0	0	0	0	9	11	2	0	0.03937
Idledale	2350	60%	4	1	0	1	0	0	0	6	10	4	0	0.03937
El Rancho	2340	75%	2	1	0	0	0	0	0	3	4	1	0	0.03937
Morrison	2330	63%	29	6	2	3	0	1	0	41	65	24	0	0.03937
Choke Cherry Resvr	2320	79%	18	2	2	0	0	0	0	22	28	6	0	0.03937
Genesee Village	2310	100%	10	0	0	0	0	0	0	10	10	0	0	0.03937
Kinney Peak	2280	100%	3	0	0	0	0	0	0	3	3	0	0	0.03937
Cub Cr below Blue	2270	75%	5	0	1	0	0	0	0	6	8	2	0	0.03937
Brook Forest	2260	67%	1	1	0	0	0	0	0	2	3	1	0	0.03937
Rosedale	2250	75%	5	0	1	0	0	0	0	6	8	2	0	0.03937
Cold Sprg Glch conf	2240	67%	5	0	0	1	0	0	0	6	9	3	0	0.03937
Bear Cr below Cub	2230	50%	3	3	0	0	1	0	0	7	14	7	0	0.03937
Niver Detention	1900	91%	9	1	0	0	0	0	0	10	11	1	0	0.03937
Sand Creek Park	1800	100%	19	0	0	0	0	0	0	19	19	0	0	0.03937
Cherry Cr @ Steele	1720	92%	33	3	0	0	0	0	0	36	39	3	0	0.03937
Shop Creek	1710	71%	13	1	0	0	0	1	0	15	21	6	0	0.03937
Cherry Cr @ Champa	1700	100%	19	0	0	0	0	0	0	19	19	0	0	0.03937
SPR at Henderson	1660	89%	7	1	0	0	0	0	0	8	9	1	0	0.03937
SPR at Union Ave.	1640	93%	25	2	0	0	0	0	0	27	29	2	0	0.03937
Slaughterhouse Glch	1620	60%	1	2	0	0	0	0	0	3	5	2	0	0.03937
Englewood Dam	1600	75%	2	1	0	0	0	0	0	3	4	1	0	0.03937
Lakewood CC	1550	86%	33	3	0	1	0	0	0	37	43	6	0	0.03937
Bear Creek @ Lowell	1530	33%	1	1	1	0	0	1	0	4	12	8	0	0.03937
Powers Park	1500	93%	35	3	0	0	0	0	0	38	41	3	0	0.03937
A2-Wx-Diamond Hill	1420	33%	0	0	1	0	0	0	0	1	3	2	0	0.03937

Upper Sloan Det.	1400	88%	27	1	0	1	0	0	0	29	33	4	0	0.03937
West Metro FS13	1370	100%	34	0	0	0	0	0	0	34	34	0	0	0.03937
Denver Zoo	1360	85%	36	3	2	0	0	0	0	41	48	7	0	0.03937
Chatfield COE	1350	97%	29	1	0	0	0	0	0	30	31	1	0	0.03937
Sanderson at Xavier	1340	92%	43	1	0	1	0	0	0	45	49	4	1	0.03937
SPR at 3rd Ave	1320	100%	33	0	0	0	0	0	0	33	33	0	0	0.03937
Hidden Lake	1300	100%	21	0	0	0	0	0	0	21	21	0	0	0.03937
Broomfield 3207	1200	73%	19	3	1	0	1	0	0	24	33	9	0	0.03937
Gunbarrel	1110	95%	37	2	0	0	0	0	0	39	41	2	0	0.03937
Louisville Rec Ctr	1100	100%	23	0	0	0	0	0	0	23	23	0	1	0.03937
Heritage Square	1060	100%	18	0	0	0	0	0	0	18	18	0	0	0.03937
Jeffco Fairgrounds	1050	100%	16	0	0	0	0	0	0	16	16	0	0	0.03937
Lena @ U.S. Hwy 6	1040	71%	8	1	0	1	0	0	3	10	14	4	0	0.03937
NREL/S. Table Mtn.	1030	92%	11	1	0	0	0	0	0	12	13	1	0	0.03937
Denver West	1010	97%	31	1	0	0	0	0	0	32	33	1	0	0.03937
A2-Maple Grove Resv.	1000	100%	46	0	0	0	0	0	0	46	46	0	0	0.03937
Pump Sta 3	970	100%	5	0	0	0	0	0	0	5	5	0	0	0.03937
Piney at Liverpool	950	100%	2	0	0	0	0	0	0	2	2	0	0	0.03937
Aurora Regional Pond	940	68%	13	0	1	0	0	1	0	15	22	7	0	0.03937
A2-Murphy Creek GC	870	80%	7	0	1	0	0	0	0	8	10	2	0	0.03937
Flying J	850	95%	18	1	0	0	0	0	0	19	20	1	0	0.03937
Fire Station 12	840	100%	9	0	0	0	0	0	0	9	9	0	0	0.03937
ETG @ Buckley	820	100%	10	0	0	0	0	0	0	10	10	0	0	0.03937
Granby Ditch @ 6th	810	100%	22	0	0	0	0	0	0	22	22	0	0	0.03937
Sable Ditch @ 18th	800	100%	25	0	0	0	0	0	0	25	25	0	0	0.03937
Mission Viejo Park	760	100%	18	0	0	0	0	0	0	18	18	0	0	0.03937
Confluence Pond	720	89%	16	0	1	0	0	0	0	17	19	2	1	0.03937
Horseshoe Park Drop	710	100%	12	0	0	0	0	0	0	12	12	0	0	0.03937
Toll Gate @ 6th	700	83%	14	0	0	1	0	0	0	15	18	3	0	0.03937
Goldsmith @ Eastman	640	96%	26	1	0	0	0	0	0	27	28	1	0	0.03937
Temple Pond at DTC	630	96%	24	1	0	0	0	0	0	25	26	1	0	0.03937
Quincy/Highline	620	95%	33	2	0	0	0	0	0	35	37	2	0	0.03937
Harvard @ Jackson	610	95%	39	2	0	0	0	0	0	41	43	2	0	0.03937
Harvard Gulch Park	600	100%	31	0	0	0	0	0	0	31	31	0	0	0.03937
Parker/Mississippi	540	89%	21	3	0	0	0	0	0	24	27	3	0	0.03937
Fire Station #19	530	100%	41	0	0	0	0	0	0	41	41	0	0	0.03937
Jewell Detention	520	100%	23	0	0	0	0	0	0	23	23	0	0	0.03937
Virginia Court	510	100%	22	0	0	0	0	0	0	22	22	0	0	0.03937
Havana Park	500	100%	25	0	0	0	0	0	0	25	25	0	0	0.03937
Fire Station #7	440	100%	26	0	0	0	0	0	0	26	26	0	0	0.03937
Utah Park	430	100%	2	0	0	0	0	0	1	2	2	0	0	0.03937
Expo Park	420	100%	20	0	0	0	0	0	0	20	20	0	0	0.03937
Kelly Dam	410	100%	19	0	0	0	0	0	0	19	19	0	0	0.03937
Van Bibber @ Hwy 93	330	67%	1	1	0	0	0	0	0	2	3	1	0	0.03937
Sports Complex	320	98%	38	1	0	0	0	0	0	39	40	1	0	0.03937
Guy Hill Ranch	310	100%	14	0	0	0	0	0	0	14	14	0	0	0.03937
Van Bibber Park	300	97%	29	1	0	0	0	0	0	30	31	1	0	0.03937
Upper Leyden	220	88%	33	5	0	0	0	0	0	38	43	5	0	0.03937
Leyden Confluence	210	82%	33	2	1	0	1	0	0	37	45	8	0	0.03937
Leyden Reservoir	200	100%	15	0	0	0	0	0	0	15	15	0	0	0.03937
Nott Creek	150	98%	38	1	0	0	0	0	0	39	40	1	0	0.03937
Ralston Reservoir	110	91%	27	1	1	0	0	0	0	29	32	3	0	0.03937
A2-Carr Street	100	100%	48	0	0	0	0	0	0	48	48	0	0	0.03937
WX-EPC at Hwy 105	3010	85%	66	7	3	0	0	0	0	76	89	13	0	0.01
Porphory Mtn	4850	92%	33	3	0	0	0	0	1	36	39	3	1	0.01
Fairview Peak	4860	95%	39	2	0	0	0	0	0	41	43	2	0	0.01
A2-Magnolia WX-Precip	6601	100%	112	0	0	0	0	0	0	112	112	0	0	0.01
A2-ETG @ Hampden Precip	100110	50%	0	1	0	0	0	0	0	1	2	1	0	0.03937

A2-Blackstone Precip	100100	80%	3	1	0	0	0	0	0	4	5	1	0	0.03937			
A2-Weir Gulch - Precip	100320	100%	5	0	0	0	0	0	0	5	5	0	0	0.03937			
A2-CoalCreek at McCaslin - Precip	100300	98%	38	1	0	0	0	0	0	39	40	1	1	0.03937			
A2-Westerly Cr Dam Precip	100240	94%	14	1	0	0	0	0	0	15	16	1	0	0.03937			
A2-Havana Pond Precip	100230	100%	11	0	0	0	0	0	0	11	11	0	0	0.03937			
A2-OneRain Weather - Precipitation	100200	85%	135	28	1	0	0	0	1	164	194	30	0	0.01			
A2-Sand Creek at Colfax Precip	100160	100%	12	0	0	0	0	0	0	12	12	0	0	0.03937			
Little Narrows	4470	67%	1	1	0	0	0	0	0	2	3	1	0	0.03937			

2016 Monthly Peak Hour ALERT Radio Traffic Summary

