Analysis of Network Outage Reports for NRSC Meeting

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Overview of Presentation

- Network Reliability Status
- Improvements to NORS
- NRSC Activities

Frequency of Outages by Month

Standards for Outage Frequencies

- Took average of January 2007 through October 2007 as the standard

Outage Index – For All Outages Except DS3-Simplex

Last 6 months have been very high

See PRQC-2006-019 for a description of the method used to calculate the outage index.

DS3-Simplex

DS3-Simplex - Number of Events
Number of Events
Month
Feb-07
Apr-07
Jun-07
Aug-07
Oct-07
Dec-07
Feb-08
Apr-08
Jun-08
Aug-08
Oct-08
Dec-08
Feb-09
Apr-09
Jun-09
Aug-09
Oct-09
Dec-09
Feb-10
Apr-10
Jun-10
Aug-10

E911

E911 - Number of Events
Number of Events
Month
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09
Jul-09
Sep-09
Nov-09
Jan-10
Mar-10
May-10
Jul-10
Sep-10

Very Large E911 Outages

E911 – Phase 2 Events

Phase 2 vs. All Other E911 Outages

Fiber Cut

Fiber Cut - Number of Events
Number of Events
Month
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09
Jul-09
Sep-09
Nov-09
Jan-10
Mar-10
May-10
Jul-10
Sep-10

Wireline

Wireline outages are all outages for which the Reason Reportable was at least 900,000 wireline user-minutes.

DS3 (Non-Simplex) Events

DS3 (Non-Simplex) Events

Big DS3 Outages

For 2010, the number of outages from January September was multiplied by 1.3

Procedural Events

Procedural events are ones which have a procedural root cause.

Procedural Events

Procedural Events by Source

Wireless

Wireless - Number of Events
Number of Events
Month
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09
Jul-09
Sep-09
Nov-09
Jan-10
Mar-10
May-10
Jul-10
Sep-10

Wireless with Trend Line

SS7

SS7 - Number of Events
Number of Events
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09
Jul-09
Sep-09
Nov-09
Jan-10
Mar-10
May-10
Jul-10
Sep-10
Month

SS7 and Diversity

Digital Cross Connect Systems

Malicious Events

Malicious Activity

- 500 outage reports where malicious activity was indicated (188 in 2007, 188 in 2008, 83 in 2009 and 105 in 2010)
- No outages seemed to be related to terrorist activities.
- About 53% of the reports (44) mentioned vandalism in 2009 and 56% (59) mention vandalism in 2010.
- About 12% of the reports (10) mentioned gun or shots in 2009 and 7.6% (8) in 2010.

Telecommunications Service Priority

Telecommunications Service Priority

- About 25 outages per month in 2007 check TSP
- About 18.5 outages per month in 2008 check TSP
- About 27 outages per month in 2009 check TSP
- About 29 outages per month in 2010 check TSP

Outage Durations (Hours) – 2010

	5% Percentile	10% Percentile	25% Percentile	Median	75% Percentile	90% Percentile	95% Percentile
Airport	0.98	1.26	2.37	4.96	17.05	47.36	87.07
Blocking	0.68	1.16	2.12	4.58	9.97	24.20	98.62
Cable Telephony	0.90	1.35	3.59	8.01	23.79	47.10	64.34
DS3	1.40	2.27	5.13	13.54	28.83	49.93	75.01
DS3-Simplex	121.01	123.61	141.11	188.78	411.01	730.79	1131.72
E911	0.82	1.08	2.00	4.30	8.60	17.50	25.42
MSC	0.56	0.58	1.28	2.57	3.53	10.30	11.59
SS7	0.73	0.77	1.67	3.65	7.83	28.31	62.61
Wireless	1.22	1.93	3.83	8.48	21.33	41.83	63.38
Wireline	3.06	5.07	19.57	66.57	136.98	253.16	360.79
All Except DS3-Simplex	**1.20**	**1.91**	**4.25**	**11.83**	**30.60**	**73.61**	**124.45**

Outage Durations (Hours) in 2009

	5% Percentile	10% Percentile	25% Percentile	Median	75% Percentile	90% Percentile	95% Percentile
Airport	1.05	1.55	2.69	5.52	18.45	58.14	84.07
Blocking	0.74	1.00	1.83	3.92	7.75	14.08	25.47
Cable Telephony	0.92	1.17	3.18	6.58	24.15	59.37	80.95
DS3	1.46	2.32	6.55	24.22	33.07	62.28	87.80
DS3-Simplex	72.74	120.91	131.38	170.69	286.40	666.01	1076.30
E911	0.80	1.10	2.12	4.20	8.22	19.98	30.80
MSC	0.63	0.94	1.60	2.25	4.85	9.32	20.12
SS7	0.50	0.50	0.70	1.92	4.00	11.43	.
Wireless	0.81	1.14	2.27	4.89	12.04	30.03	50.66
Wireline	3.05	5.34	20.00	61.92	117.78	192.49	258.83
All Except DS3-Simplex	**1.17**	**1.90**	**4.65**	**18.25**	**36.45**	**78.24**	**122.27**

Test for Trend in Event Duration

Non-DS3-Simplex Outages Data from 2009 and 2010

Rank Correlation of duration with date is -.02 and is barely significant

Conclusion: Non DS3-Simplex Outages may be getting a little shorter from 1/09 to 2/10

DS3-Simplex Events Only Data from 2009 and 2010

Rank Correlation of duration with date is .04 and is not significant

Conclusion: DS3-Simplex Events are not changing in duration from 1/09 to 2/10

Customers Affected Vs. Duration (DS3-Simplex Excluded)

Inside and Outside a Building - 2010

Customers Affected	30 Min to 1 Hr	1 to 2 Hr	2 to 4 Hr	4 to 8 Hr	8 Hr to 1 Day	1 Day to 1 Week	> 1 Week
1 to 1000 Cust	1.0%	2.4%	3.3%	2.8%	8.1%	73.3%	9.2%
1,000 to 10,000	0.3%	0.9%	9.5%	20.7%	45.5%	22.0%	1.0%
10,000 to 30,000	2.5%	14.9%	22.0%	22.0%	25.2%	12.7%	0.8%
30,000 to 50,000	7.7%	14.7%	22.4%	22.3%	21.2%	11.0%	0.7%
50,000 to 100,000	7.2%	12.9%	18.4%	26.7%	23.5%	11.2%	0.2%
100K to 300K	7.9%	15.4%	23.5%	26.9%	18.2%	7.6%	0.6%
300K to 1 Million	11.5%	12.6%	19.3%	26.7%	22.6%	5.6%	1.9%
> 1 Million	9.3%	12.4%	18.1%	26.9%	29.5%	3.1%	0.5%

Inside and Outside a Building - 2009

Customers Affected	30 Min to 1 Hr	1 to 2 Hr	2 to 4 Hr	4 to 8 Hr	8 Hr to 1 Day	1 Day to 1 Week	> 1 Week
1 to 1000 Cust	0.6%	1.3%	2.5%	2.3%	6.7%	81.3%	5.4%
1,000 to 10,000	0.5%	1.6%	9.1%	18.7%	38.1%	30.7%	1.3%
10,000 to 30,000	4.3%	16.6%	24.5%	25.5%	19.5%	9.1%	0.6%
30,000 to 50,000	8.5%	22.7%	20.6%	21.2%	18.9%	7.4%	0.7%
50,000 to 100,000	7.6%	17.9%	21.0%	25.3%	22.9%	5.3%	0.0%
100K to 300K	8.3%	20.5%	22.9%	24.9%	17.5%	4.8%	1.1%
300K to 1 Million	10.7%	15.8%	21.8%	22.6%	20.1%	7.3%	1.7%
> 1 Million	5.7%	7.3%	22.0%	31.7%	28.5%	3.3%	1.6%

Customers Affected Vs. Duration (DS3-Simplex Excluded) - 2010

Inside a Building

Customers Affected	30 Min to 1 Hr	1 to 2 Hr	2 to 4 Hr	4 to 8 Hr	8 Hr to 1 Day	1 Day to 1 Week	> 1 Week
1 to 1000 Cust	0.8%	1.4%	2.1%	1.3%	7.9%	84.9%	1.5%
1,000 to 10,000	0.3%	1.1%	11.2%	18.6%	44.7%	23.2%	0.8%
10,000 to 30,000	2.7%	19.1%	26.4%	20.0%	21.5%	9.6%	0.7%
30,000 to 50,000	10.3%	19.1%	24.2%	19.3%	16.8%	9.7%	0.6%
50,000 to 100,000	9.7%	17.2%	22.7%	24.4%	15.3%	10.4%	0.3%
100K to 300K	10.4%	20.2%	26.1%	23.1%	13.2%	6.7%	0.4%
300K to 1 Million	14.3%	18.2%	22.7%	22.7%	17.5%	3.9%	0.6%
> 1 Million	14.2%	14.2%	24.8%	25.7%	18.6%	1.8%	0.9%

Outside a Building

Customers Affected	30 Min to 1 Hr	1 to 2 Hr	2 to 4 Hr	4 to 8 Hr	8 Hr to 1 Day	1 Day to 1 Week	> 1 Week
1 to 1000 Cust	1.3%	3.8%	4.9%	4.8%	8.3%	56.7%	20.1%
1,000 to 10,000	0.1%	0.7%	6.7%	24.3%	46.8%	20.1%	1.4%
10,000 to 30,000	2.3%	8.6%	15.4%	24.9%	30.7%	17.1%	1.0%
30,000 to 50,000	3.3%	7.2%	19.4%	27.3%	28.6%	13.2%	1.0%
50,000 to 100,000	3.6%	6.8%	12.3%	30.0%	35.0%	12.3%	0.0%
100K to 300K	3.6%	7.0%	19.1%	33.4%	26.7%	9.1%	0.9%
300K to 1 Million	7.8%	5.2%	14.7%	31.9%	29.3%	7.8%	3.4%
> 1 Million	2.5%	10.0%	8.8%	28.8%	45.0%	5.0%	0.0%

Changes to NORS

Added ability to change company type

Comments and suggestions are greatly appreciated

NRSC Activities

- Wireless Team
- DS3 (Non-Simplex) Team
- Wireline Team
- E911 Team
- Outage Reporting Advisory Team
  - Improvements to the NORS System
  - Improvements to the template
  - Recommended ways to communicate information
  - Recommendations on cause categories