EXHIBIT LIST
DOCKET TITLE: Verizon/Frontier Transfer
DOCKET NUMBER: UT-090842
DATE: December 15 - 18, 2009

WITNESS: VERIZON: STEPHEN EDWARD SMITH				
SES-1T	Smith			Prefiled Rebuttal Testimony of Stephen Edward Smith (37 pp.) (11/19/09)
CROSS-EXAMINATION EXHIBITS:				
	Public Counsel			Joint Applicants' Response to PC Data Request No. 354
	Public Counsel			Joint Applicants' Response to PC Data Request No. 355
	Public Counsel			Joint Applicants' Response to PC Data Request No. 356
	Public Counsel			Joint Applicants' Response to PC Data Request No. 357
	Public Counsel			Joint Applicants' Response to PC Data Request No. 360 Highly Confidential (Attachments PC Set 25 FRO360j Backbone Trending HIGHLY CONFIDENTIAL.doc)
	Public Counsel			Joint Applicants' Response to PC Data Request No. 362
	Public Counsel			Joint Applicants' Response to PC Data Request No. 386
	Public Counsel			Joint Applicants' Response to PC Data Request No. 388
	Public Counsel			Joint Applicants' Response to PC Data Request No. 389
	Public Counsel			Joint Applicants' Response to PC Data Request No. 391
	Public Counsel			Joint Applicants' Response to PC Data Request No. 392
	Public Counsel			Joint Applicants' Response to PC Data Request No. 393
	Public Counsel			Joint Applicants' Response to PC Data Request No. 416
	Public Counsel			Joint Applicants' Response to PC Data Request No. 418
	Public Counsel			Joint Applicants' Response to PC Data Request No. 420
	Public Counsel			Joint Applicants' Response to PC Data Request No. 422
	Public Counsel			Joint Applicants' Response to PC Data Request No. 424

EXHIBIT LIST

DOCKET TITLE: Verizon/Frontier Transfer

DOCKET NUMBER: UT-090842

DATE: December 15 - 18, 2009

	Public Counsel			Joint Applicants' Response to PC Data Request No. 426
	Public Counsel			Joint Applicants' Response to PC Data Request No. 427
	Public Counsel			Joint Applicants' Response to PC Data Request No. 430
	Public Counsel			Joint Applicants' Response to PC Data Request No. 431
	Public Counsel			Vermont Report on E911 Outage (Report date December 18, 2008)

Docket No. UT-090842
Verizon and Frontier Responses to Public Counsel Data Request Nos. 349-357
October 14, 2009

PUBLIC COUNSEL DATA REQUEST NO. 354:

Please identify all Verizon assets that Frontier will take possession of associated with the provision of "Internet access," as that term is used in the Agreement and Plan of the Merger. With regard to the facilities associated with "Internet access," please answer the following questions:

a. At what point of network demarcation does Verizon's existing Internet access terminate, and at which point does Frontier's acquired Internet access facilities begin? For example, as part of this transaction, is Frontier taking possession of DSLAMs?
b. Is Frontier taking possession of any Internet access facilities on the trunk side of the DSLAM?
c. Is Frontier taking possession of data networks currently utilized by Verizon to provide Internet access that connect to regional or national backbone networks?
d. Is the point of demarcation between Verizon's retained Internet access facilities and those Internet access facilities that will be transferred to Frontier the same for all Spinco properties? If not, please explain in detail.

Response:

Applicants assert Objection Nos. 3, 7, 9, and 12. Subject to and without waiver of the objections, Applicants respond as follows:

a. Frontier will take possession of all DSLAMs (digital subscriber line access multiplexer), GWRs (gateway routers), ATM (Asynchronous Transfer Mode) switches, and LCRs (LATA core routers) providing Internet access in central offices in the states involved in the transaction. The uplinks from these devices are currently being planned and have not been finalized. One potential option is for Frontier to uplink these devices to the Frontier National Data Backbone that transports Internet traffic to Frontier's peering partners. Frontier's Internet access network would begin with the facilities at the customer premises and the termination point is in the planning process.

b. Frontier will take possession of most Internet access facilities on the trunk side of the DSLAM including GWRs, ATM switches and LCRs. Planning is still being performed on sites where the DSLAM is directly connected to a Verizon-retained POP location.

c. No, Verizon will retain network components that comprise the current Verizon regional and national backbone networks. Frontier already has in place a regional and national backbone network that will be expanded as required to support the additional customer traffic.

d. The point of demarcation between Frontier and Verizon has not yet been finalized. Until the regional uplink network design is finalized, it will not be determined if Frontier will connect to the Verizon Internet access facilities.

Prepared By: James Miggans and Cassandra Guinness
Date: October 14, 2009
Witness: To be determined

Docket No. UT-090842
Verizon and Frontier Responses to Public Counsel Data Request Nos. 349-357
October 14, 2009

PUBLIC COUNSEL DATA REQUEST NO. 355:

Please explain how Frontier will connect each DSLAM located in Washington to higher levels of the Internet.

a. Will Frontier utilize its own facilities, and if so, are those facilities currently in place? Also, if yes, please describe the facilities that Frontier owns in Washington that are capable of connecting the DSLAMs that it will acquire from Verizon to higher levels of the Internet.

b. Will Frontier lease facilities or purchase services from Verizon to connect each DSLAM in Washington to higher levels of the Internet? If yes, please provide copies of the service contracts, and service level agreements which Frontier has entered into with Verizon.

c. Will Frontier lease facilities, or purchase services from a third-party vendor to connect each DSLAM in Washington to higher levels of the Internet? If yes, please provide copies of the service contracts, and service level agreements which Frontier has entered into with the third-party vendor.

Response:

Applicants assert Objection Nos. 3, 7, 8 and 12. Subject to and without waiver of the objections, Frontier responds as follows:

a. Frontier will acquire the network facilities from Field-located DSLAMs to the Central Office. Central Offices connect to regional hub offices via a variety of types of facilities including owned fiber systems, owned radio systems and leased circuits. Regional hub offices will be connected to the Frontier backbone. Typically, these are leased circuits from our regional hubs to a core POP. Frontier's national backbone utilizes Frontier owned routers and leased facilities to connect national POP locations. Several of these POP locations are peering locations where Internet traffic is interconnected with other providers.

b. Frontier will need to lease facilities through non-acquired areas. Frontier's standard practice is to contact several vendors and determine which vendor offers the best route and price. A selection of vendors has not been made yet. Selection is expected to be completed no earlier than late December 2009.

c. See response to b.

Prepared By: Cassandra Guinness
Date: October 14, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 356:

Please identify all Verizon assets that Frontier will take possession of associated with the provision of "certain long distance services," as that term is used in the Agreement and Plan of the Merger. With regard to these facilities associated with "certain long distance services," please answer the following questions:

a. At what point of network demarcation do Verizon's existing facilities that provide "certain long distance services" terminate, and at which point to the facilities that Frontier will acquire that provide "certain long distance services" begin? For example, as part of this transaction, is Frontier taking possession of Verizon toll serving offices?

b. Is Frontier taking possession of any long distance access facilities on the trunk side of the toll serving office?

c. Is Frontier taking possession of long distance networks currently utilized by Verizon to provide "certain long distance services" that connect to regional or national long-distance networks?

d. Is the point of demarcation between facilities used to provide "certain long distance services" by Verizon and those that will be transferred to Frontier the same for all Spinco properties? If not, please explain in detail.

Response:

Applicants assert Objection Nos. 3, 7, 9, and 12. Subject to and without waiver of the objections, Applicants respond as follows:

Verizon is not transferring any assets to Frontier or Spinco specifically associated with providing long distance services. It will be Frontier's responsibility to enter into an arrangement with a long distance provider to provide long distance service to end users. Verizon will not transfer to Spinco any tangible assets, facilities, or agreements with facilities vendors relating to long distance (InterLATA) facilities supporting customer traffic. Frontier will make arrangements for facilities to support long distance customers. There are some internal circuits that Verizon uses to support its own internal networks which cross LATAs that may need to be rearranged, and plans for rearrangement of these circuits are being discussed internally; however, these do not involve customer long distance traffic circuits.

Prepared By: James Miggans
Date: October 14, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 357:

Please explain how Frontier will connect each toll serving office located in Washington to regional and/or national long distance networks.

a. Will Frontier utilize its own facilities, and if so, are those facilities currently in place? Also, if yes, please describe the facilities that Frontier owns in Washington that are capable of connecting the toll serving offices that it will acquire from Verizon.

b. Will Frontier lease facilities or purchase services from Verizon to connect each toll serving office in Washington to regional or national long distance networks? If yes, please provide copies of the service contracts, and service level agreements which Frontier has entered into with Verizon.

c. Will Frontier lease facilities or purchase services from a third-party vendor to connect each toll serving office in Washington to regional or national long distance networks? If yes, please provide copies of the service contracts, and service level agreements which Frontier has entered into with the third-party vendor.

Response:

Applicants assert Objection Nos. 3, 7, 10 and 12. Subject to and without waiver of the objections, Frontier responds as follows:

a. No. Frontier will use the facilities of a third party for carrying toll traffic and may use the existing network arrangements from end offices and tandems to the points of presence maintained by Verizon's IXC affiliate.

b. No. See response to a.

c. No. See response to a.

Prepared By: Cassandra Guinness
Date: October 14, 2009
Witness: To be determined

Docket No. UT-090842
Verizon and Frontier Responses to Public Counsel Data Request Nos. 360-362
October 29, 2009

PUBLIC COUNSEL DATA REQUEST NO. 362:

Please reference the deposition transcript of Timothy McCallion, dated September 30, 2009, conducted as part of Case No. 09-454-TP-ACO, before the Public Utilities Commission of Ohio. At pages 21 and 22, the following exchange occurred:

> Q. Now, could you explain how Verizon Ohio customer proprietary network information will be transferred to Frontier? You know, specifically will the replication process require CPNI to be loaded into the 25 replicated systems following their creation or will it be automatically done?
>
> A. My understanding of the way that we are planning on doing this is that we will replicate the systems and then we will delete from those replicated systems the information that is not relevant to the states that are -- the SpinCo states or the states that are moving to Frontier. Because Verizon will continue to use these systems in a few states, so the data for those -- the data for those states will be deleted out of the files.

Please compare this response to Joint Applicants response to PC-333, which states:

> CPNI will be loaded into the replicated systems following their creation. Verizon will continue to use this CPNI loaded in the replicated systems to service customers in the transferred operations in Washington from completion of the replication until closing of the proposed transaction.

The response to PC-333 indicates a two-step process that begins with the replication of the systems, followed with the loading of the CPNI. Mr. McCallion's Ohio deposition testimony appears to indicate that the CPNI is replicated along with the systems, and that unneeded CPNI is deleted. Please clarify the apparent inconsistency between Mr. McCallion's Ohio deposition testimony and the response to PC-333, and explain how CPNI will be loaded into the replicated systems.

Response:

Applicants assert Objection Nos. 3, 7 and 12. Subject to and without waiver of the objections, Applicants respond as follows:

The replication process will involve duplicating the systems and the data, loading the data into the systems, and then deleting the data that is not relevant to Spinco. Thus, both statements are correct but with emphasis on different aspects of the process.

Prepared By: James Miggans
Date: October 29, 2009
Witness: To be determined

Docket No. UT-090842
Verizon and Frontier Responses to Public Counsel Data Request Nos. 363-389
November 30, 2009

PUBLIC COUNSEL DATA REQUEST NO. 386

With regard to the per line fees mentioned by Mr. Smith on page 19, lines 1-6 of his rebuttal testimony:

a. Please explain whether the $9 per line maintenance fee identified by Mr. Smith was for the costs incurred by FairPoint under the Transitional Services Agreement.
b. Please explain whether the $9 per line fee paid by FairPoint included the costs of Verizon personnel operating Verizon systems to provide services to Frontier.
c. Please explain whether the $2 per line cost identified by Mr. Smith will change if the number of lines served by Frontier will change? Alternatively, state whether the $94 million annual fee associated with the Software License Agree will decrease if the number of lines served by Frontier decreases.
d. Please indicate Mr. Smith's understanding of how the fees associated with Software License Agreement will be determined should Frontier decide to renew the agreement.
e. Can Frontier operate the replicated systems that it will acquire from Verizon if it no longer makes any payment to Verizon associated with software licenses?

Response:

Applicants assert Objection Nos. 3, 7, and 5. Subject to and without waiver of the objections, Verizon responds as follows:

a) Yes. The $9 per line calculation related to costs pursuant to the Transition Services Agreement.
b) The $9 per line calculation includes some personnel costs.
c) Pursuant to the Software License Agreement, Frontier will pay Verizon $94 million for system support for the first year after closing. This fee price is not dependent on the number of access lines.
d) Frontier and Verizon would negotiate fees based on the maintenance services to be provided if they mutually agree to renew the agreement.
e) Frontier could operate such systems by using its own trained employees or another third party qualified to operate such system. The Software License Agreement speaks for itself.

Prepared By: James Miggans
Date: November 30, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 388

Please reference page 21, lines 6-10 of Mr. Smith's rebuttal testimony. Here he states:

> First, Verizon's long distance facilities are interconnected with Verizon Northwest's local facilities at established demarcation points, and that interconnection will remain unchanged following the transaction. Thus, there will be no "cutover" or "network separation" with respect to those demarcation points.

Verizon and Frontier's Response to Public Counsel Data Request No. 356 states:

> Verizon is not transferring any assets to Frontier or Spinco specifically associated with providing long distance services. It will be Frontier's responsibility to enter into an arrangement with a long distance provider to provide long distance service to end users. Verizon will not transfer to Spinco any tangible assets, facilities, or agreements with facilities vendors relating to long distance (InterLATA) facilities supporting customer traffic. Frontier will make arrangements for facilities to support long distance customers. There are some internal circuits that Verizon uses to support its own internal networks which cross LATAs that may need to be rearranged, and plans for rearrangement of these circuits are being discussed internally; however, these do not involve customer long distance traffic circuits.

a. Does Mr. Smith's statement indicate that Verizon will continue to provide long-distance services to Frontier customers following the closing of the transaction? If yes, please explain in detail.

b. Please provide copies of any agreement that has been reached between Frontier and Verizon with regard to Verizon acting as a long-distance carrier for Frontier customers following the close of the transaction.

Response:

Applicants assert Objection Nos. 3 and 10. Subject to and without waiver of the objections, Verizon responds as follows:

(a) No. Frontier will determine whether to enter into a relationship with Verizon whereby Verizon provides it with long distance service.
(b) The parties have not entered into any such contract.

Prepared By: James Miggans and Cassandra Guinness
Date: November 30, 2009
Witness: To be determined

Docket No. UT-090842
Verizon and Frontier Responses to Public Counsel Data Request Nos. 363-389
November 30, 2009

PUBLIC COUNSEL DATA REQUEST NO. 389

On page 21, lines 10-16 of Mr. Smith's rebuttal testimony he states:

> With respect to data connectivity, Frontier, like any other ILEC that purchases Internet backbone services, will either negotiate such services with Verizon (in which case no network rearrangement would be necessary) or establish a relationship with a different backbone provider. If Frontier chooses a new backbone provider, it would need to establish connectivity with that provider, which would involve straightforward rearrangement – something done on a regular basis by network engineers throughout the industry.

In the Joint Applicants' Response to Public Counsel Data Request No. 360 Verizon and Frontier state:

> Frontier's current backbone network capacity is 10 Gigabits per second. It is an MPLS enabled National Data Backbone. The National Data Backbone is comprised of eleven strategically and geographically located Core Data POP's throughout the United States. Five of the eleven Core Data POP's are peering points.

Frontier also discusses, in that discovery response, its plans to upgrade the backbone network.

Please explain whether Mr. Smith's statement, quoted above, indicates that Frontier's plans for its backbone network have changed, and if so, please fully explain the changes.

Response:

Applicants assert Objection No. 7. Subject to and without waiver of the objections, Verizon responds as follows:

No. Mr. Smith's comment was not making any representation about whether Frontier's plans for its backbone network have changed.

Prepared By: Cassandra Guinness and James Miggans
Date: November 30, 2009
Witness: To be determined

Docket No. UT-090842
Verizon and Frontier Responses to Public Counsel Data Request Nos. 390-452
December 1, 2009

PUBLIC COUNSEL DATA REQUEST NO. 391

a. Please identify the total number of Frontier long-distance customers in Washington state for the years ending December 31, 2004 through 2008, and year-to-date 2009.
b. Please explain how Frontier serves its long-distance customers in Washington state.
c. Please identify the location of all Frontier facilities in Washington state used by Frontier to serve existing long-distance customers in the state.

Response:

Without limitation of the other General Objections, Applicants assert Objection No. 3. Subject to and without waiver of the objections, Frontier responds as follows:

a. Frontier Communications of America is certificated in the state of Washington, but does not have a history of long-distance customers within the state.
b. Frontier does not serve any long distance customers in the state of Washington.
c. Frontier does not have any facilities supporting long distance customers in the state of Washington.

Prepared By: Cassandra Guinness
Date: December 1, 2009
Witness: To be determined

Docket No. UT-090842
Verizon and Frontier Responses to Public Counsel Data Request Nos. 390-452
December 1, 2009

PUBLIC COUNSEL DATA REQUEST NO. 392

a. Please identify the total number of Frontier dial-up Internet access customers in Washington state for the years ending December 31, 2004 through 2008, and year-to-date 2009.
b. Please explain how Frontier serves its dial-up Internet access customers in Washington state.
c. Please identify the location of all Frontier facilities in Washington state used by Frontier to serve existing dial-up Internet access customers in the state.

Response:

Without limitation of the other General Objections, Applicants assert Objection No. 3. Subject to and without waiver of the objections, Frontier responds as follows:

a. Frontier does not have a history of dial up Internet customers within the state.
b. Frontier does not serve any dial up Internet customers in the state of Washington.
c. Frontier does not have any facilities supporting dial up Internet customers in the state of Washington.

Prepared By: Cassandra Guinness
Date: December 1, 2009
Witness: To be determined

Docket No. UT-090842
Verizon and Frontier Responses to Public Counsel Data Request Nos. 390-452
December 1, 2009

PUBLIC COUNSEL DATA REQUEST NO. 393

a. Please identify the total number of Frontier broadband Internet access customers in Washington state for the years ending December 31, 2004 through 2008, and year-to-date 2009.
b. Please explain how Frontier serves its broadband Internet access customers in Washington state.
c. Please identify the location of all Frontier facilities in Washington state used by Frontier to serve existing broadband Internet access customers in the state.

Response:

Without limitation of the other General Objections, Applicants assert Objection No. 3. Subject to and without waiver of the objections, Frontier responds as follows:

a. Frontier does not have a history of broadband Internet customers within the state.
b. Frontier does not serve any dial up broadband Internet customers in the state of Washington.
c. Frontier does not have any facilities supporting broadband Internet customers in the state of Washington.

Prepared By: Cassandra Guinness
Date: December 1, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 416

Please refer to Exhibit No.___(SES-1T), p. 3, lines 15-19. Please provide all evidentiary support that Verizon "*warned*" FairPoint that it should not go into production (*i.e.*, proceed with the cut-over).

Response:

Without limitation of the other General Objections, Applicants assert Objection Nos. 3, 7, and 9. The data request misstates Mr. Smith's testimony.

Prepared By: James Miggans
Date: December 1, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 418

Please refer to Exhibit No.___(SES-1T), pp. 5, lines 21, 22.

a. Please explain, in as much detail as possible, the process Verizon uses to "replicate" its operating systems.
b. At what stage is the replication process now in? Please provide support for your response.
c. Please explain why, when an operating system is replicated by Verizon, the newly replicated system it is not considered a "new" system.
d. Please explain what parts of the original system are used in the replicated system. If no parts of the original system are used to create the replicated system, please so state.

Response:

Without limitation of the other General Objections, Applicants assert Objection Nos. 3 and 8. Subject to and without waiver of the objections, Verizon responds as follows:

Verizon describes the process for replication of operations support systems in the Rebuttal Testimony of Stephen E. Smith.

Prepared By: James Miggans
Date: December 1, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 420

Please refer to Exhibit No.___(SES-1T), p. 10, lines 12-14. During the time that Verizon will be maintaining Frontier's operating systems, will Verizon Wireless be a competitor to Frontier? If not, please explain why not.

Response:

Without limitation of the other General Objections, Applicants assert Objection No. 3 and 7.

Verizon Wireless currently offers service in Washington and is expected to continue to do so after closing.

Prepared By: James Miggans
Date: December 1, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 422

Please refer to Exhibit No.___(SES-1T), p. 14, lines 6-8. Is it Mr. Smith's testimony that, if after the 60-day trial run of the replicated systems, Frontier does not confirm that the systems are operating to their satisfaction, the deal will not close until Frontier is satisfied? If so, please cite to the specific portion of the merger agreement that gives Frontier that capability.

Response:

Without limitation of the other General Objections, Applicants assert Objection Nos. 3, 7, 10, and 11. Subject to and without waiver of the objections, Verizon responds as follows:
The Agreement speaks for itself.

Prepared By: James Miggans
Date: December 1, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 424

Please refer to Exhibit No.___(SES-1T), p. 24, lines 15, 16. Is it Mr. Smith's testimony that community service is Verizon's "most direct incentive" to operate successfully? If not, please explain what the "most direct incentive" to which he refers is. If this is his testimony, please explain where making a profit resides on the scale of important corporate incentives for Verizon. In addition, please provide complete copies of any available intercompany directives or memos that address this issue.

Response:

Without limitation of the other General Objections, Applicants assert Objection Nos. 3, 7, and 9. The data request has no nexus to the referenced testimony and Mr. Smith's testimony speaks for itself.

Prepared By: James Miggans
Date: December 1, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 426

Please refer to Exhibit No.___(SES-1T), p. 33, line 19 through p. 34, line 3.

a. With regard to operating and maintenance, general and administrative, taxes, depreciation, and all capital cost expenses, please describe in as much detail as possible (including all assumptions) the allocation process used to carve out Spinco's operations from Verizon in 2008.
b. What advertising costs were allocated to Spinco in 2008? Please provide support for your response.
c. Please provide any and all evidence showing that Ernst & Young tested and approved the specific allocation process used by Verizon to determine the income statement and balance sheet of Spinco. (*e.g.*, internal reports, memos, e-mails, and/or telephone logs specifically related to the allocation process in the carve-out of Spinco)

Response:

Without limitation of the other General Objections, Applicants assert Objection Nos. ##. Subject to and without waiver of the objections, Verizon responds as follows:

a) Mr. Smith's testimony speaks for itself. As stated on page 35, "if Mr. Hill perceives ambiguity regarding these allocation methodologies, he need look no farther than VSTO's financial statements themselves, where they are clearly disclosed in the footnotes." Refer to the footnote 1 in the VSTO financial statements, where the allocation methodologies are described in detail.
b) Nearly all of Verizon's advertising expenses are allocated to its states. In preparing the 2008 financial statements of VSTO, advertising expense allocations to the VSTO states and non-regulated entities were combined. Such expenses include print, online and media (television and radio) production and placement, direct mail advertising, events and related costs.
c) See Mr. Smith's testimony on page 34, "the financial statements of these operating telephone companies and the VSTO financial statements for the annual periods are audited, and quarterly periods are reviewed, by E&Y." It is not appropriate for independent auditors to render an opinion or "approve" accounting processes or assumptions. See E&Y's Report of Independent Auditors accompanying the VSTO annual financial statements for a more complete description of E&Y's procedures. Verizon has no other information or documentation regarding E&Y's testing of the allocation process.

Prepared By: James Miggans
Date: December 1, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 427

Please refer to Exhibit No.___(SES-1T), p. 34, lines 10-14. Please provide any and all objective evidence that the allocation process used to carve-out the income statement of Spinco was identical to that used in preparing the financial statements of Verizon Northwest. If it is not Mr. Smith's testimony that the allocation process is identical, please so state.

Response:

Without limitation of the other General Objections, Applicants assert Objection No. 5. Subject to and without waiver of the objections, Verizon responds as follows:

See the footnotes to Verizon's annual audited financial statements.

Prepared By: James Miggans
Date: December 1, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 430

Please refer to Exhibit No.___(SES-1T), p. 36, lines 3-6.

a. Please list all outstanding debt of the companies in the 14 states comprising VSTO and provide support to show how those amounts were determined.
b. Please identify the amount of inter-company indebtedness that was included in the VSTO statements and indentify the borrower and lender for each. Please provide supporting documentation.
c. Please explain why "new debt at the parent level" would be included in VSTO debt.

Response:

Without limitation of the other General Objections, Applicants assert Objection Nos. 3, 7, and 9. Subject to and without waiver of the objections, Verizon responds as follows:

a. See response to PC Set 28 461e.

b. The amount of intercompany debt is irrelevant because this debt will not be an obligation of VSTO or Frontier after the closing of the transaction.

c. VSTO does not have $3.3 billion in indebtedness. Based upon the total principal amount of outstanding debt of the companies that will become subsidiaries of Spinco, as of March 31, 2010, Spinco will assume debt of certain Verizon subsidiaries which are part of VSTO in the principal amount of $425 million. The total amount of debt that will be incurred or assumed by Spinco at closing is $3.3 billion. Therefore, Spinco will borrow $2.908 billion prior to the spin-off and the total debt incurrence and assumption of debt by Spinco will be $3.3B. This debt will become the parent company's debt when Spinco merges into the parent at closing.

Prepared By: James Miggans
Date: December 1, 2009
Witness: To be determined

PUBLIC COUNSEL DATA REQUEST NO. 431

Please refer to Exhibit No.___(SES-1T), p. 36, lines 10-13.

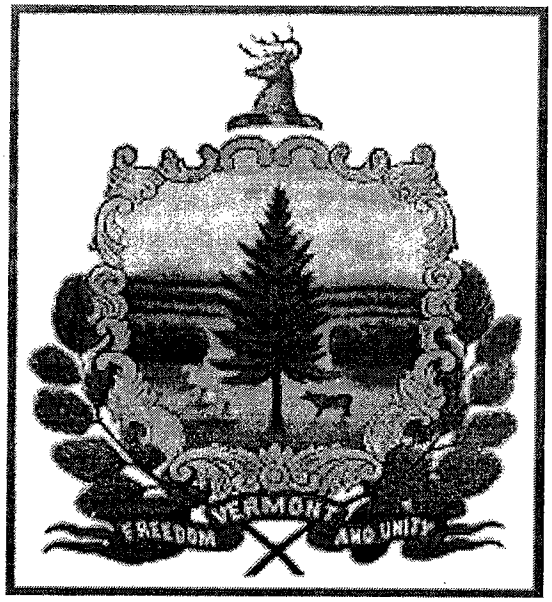
a. Please provide any and all objective evidence showing that Frontier management tested and approved the specific allocation process used by Verizon to determine the income statement and balance sheet of Spinco (*e.g.*, internal reports, memos, e-mails, and/or telephone logs specifically related to the allocation process in the carve-out of Spinco).
b. Please provide any and all objective evidence showing that Frontier shareholders tested and approved the specific allocation process used by Verizon to determine the income statement and balance sheet of Spinco (*e.g.*, internal reports, memos, e-mails, and/or telephone logs specifically related to the allocation process in the carve-out of Spinco).
c. Please provide any and all objective evidence showing that the financial analyst community tested and approved the specific allocation process used by Verizon to determine the income statement and balance sheet of Spinco (*e.g.*, internal reports, memos, e-mails, and/or telephone logs specifically related to the allocation process in the carve-out of Spinco).
d. Please provide any and all objective evidence showing that the banks that wrote Frontier's fairness opinion tested and approved the specific allocation process used by Verizon to determine the income statement and balance sheet of Spinco (*e.g.*, internal reports, memos, e-mails, and/or telephone logs specifically related to the allocation process in the carve-out of Spinco).

Response:

Without limitation of the other General Objections, Applicants assert Objection Nos. 3, 5, 7, 8, and 9. The data request is vague, ambiguous, and argumentative. Moreover, the request is overbroad, unduly burdensome, and not reasonably calculated to lead to the discovery of admissible evidence.

Prepared By: James Miggans and Cassandra Guinness
Date: December 1, 2009
Witness: To be determined

Partial Outage of the Vermont Enhanced 911 System



December 18, 2008

A Report Regarding the Partial Outage of the Vermont Enhanced 911 System on September 3, 2008

Prepared by:

Vermont Department of Public Service
112 State Street
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Partial Outage of the Vermont Enhanced 911 System

December 18, 2008

A Report Regarding the Partial Outage of the Vermont Enhanced 911 System on September 3, 2008

Prepared by:

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INTRODUCTION

This report describes a partial outage of the Vermont Enhanced 911 system which occurred on September 3, 2008. The report offers a description of the current E911 system architecture and an overview of the investigation conducted by the Department, provides a root cause determination for the September 3 partial outage, and finally offers some recommendations for action. This report is based on the review of reports issued by The Vermont E911 Board, microDATA and FairPoint, as well as FairPoint and Verizon responses to Department questions.

RESPONSIBILITIES

The E911 Board is responsible for the operation of the E911 network. The Board has a commercial contract with FairPoint under which FairPoint provides key transport facilities and call aggregation services. Under the terms of the TSA,[1] Verizon provides a host of services to FairPoint including networking monitoring. In addition, as the Overall Control Organization (OCO), Verizon is the primary contact for interaction with the E911 Board. Finally the E911 Board has a separate contract with microDATA to maintain and operate key components of the E911 network (among other services).

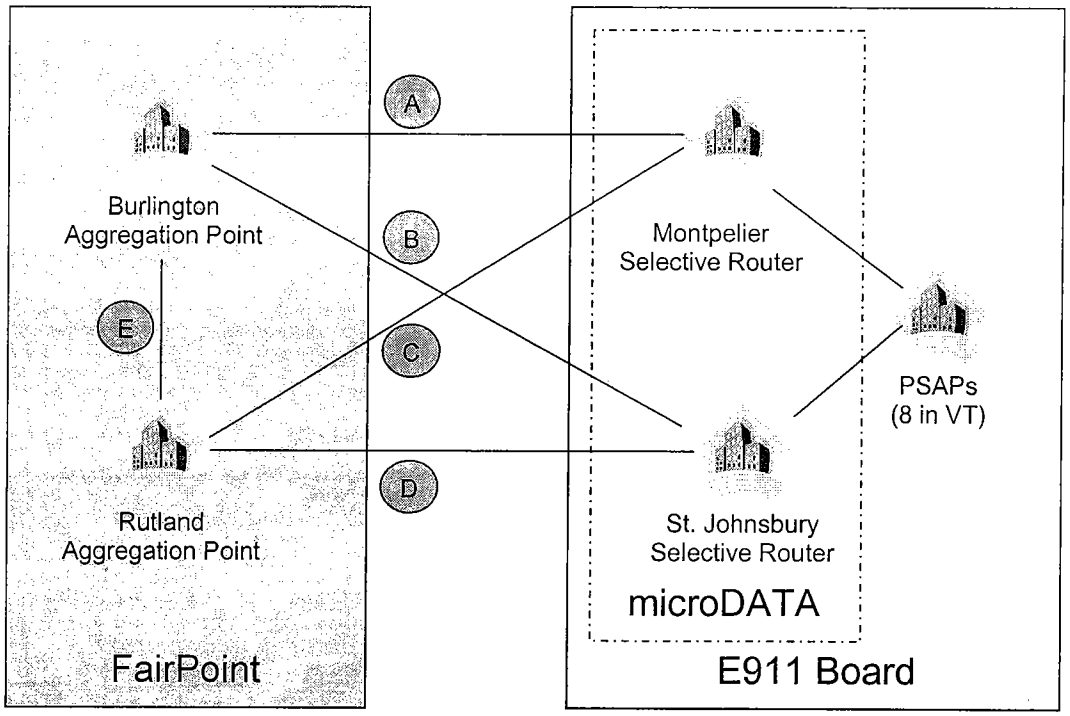
VERMONT E911 NETWORK

E911 networks are designed to direct emergency calls to the Public Safety Answering Points (PSAPs) closest to the caller, while allowing a high level of redundancy to redirect calls to other PSAPs in case of network congestion or network failure. These networks consist of three fundamental components: central office telephone switches that aggregate calls, selective routers that determine the appropriate PSAP for each call, and the PSAPs themselves. In Vermont, calls are directed to FairPoint switches in Burlington and Rutland (the aggregation points), and from there they are directed to selective routers in either Montpelier or St. Johnsbury. The selective routers then direct the calls to the appropriate PSAP at public safety facilities around the state.

The Vermont network was designed for a very high level of redundancy. In other words, the network is designed so that every caller should always get through to a PSAP when making a call. Each of the two aggregation points is connected to each of the two selective routers, as well as to the other aggregation point. This results in five paths connecting these key facilities, labeled A through E on Diagram 1. The switches at the aggregation points have routing rules designed to make full use of the redundant paths in the network. For instance, in the event of congestion or failure on path A, calls from Burlington should be redirected to path B to St. Johnsbury. If both paths A and B are unavailable, calls should be directed to path E to Rutland, and from there to Montpelier on path C or to St Johnsbury on path D. Each selective router can transfer calls to any of the eight PSAPs throughout the state.

[1] Transition Services Agreement. Under the terms of the FairPoint acquisition of the Verizon Vermont service territory, Verizon provides a portfolio of services to FairPoint until cutover to new FairPoint systems.

Diagram 1: Vermont E911 Network Topology



EVENTS SUMMARY

Records indicate that at approximately 9:30 am on Wednesday, September 3, 2008, E911 calls from the northern part of Vermont were blocked from reaching any PSAPs. The problem was recognized very soon after it appeared by many entities. The E911 Board report indicates that PSAPs identified and reported the problem, while FairPoint responses indicate that a Verizon monitoring system also identified the problem. Verizon set up a conference call including FairPoint and microDATA to isolate and resolve the problem. The E911 Board report indicates that calls were connecting properly as of 11:01am. There were numerous test calls placed during the outage period by various entities, and therefore it is impossible to determine the number of real emergency calls that were dropped. Analysis of historical data indicate that up to 20 calls may have been missed.

The E911 Board, microDATA, and FairPoint each offered after-action reports immediately following the incident. Afterward, the Department continued a detailed investigation, culminating in this report.

INVESTIGATION ACTION

The following table lists the events pertinent to the Department investigation:

Date	Action
September 4, 2008	The Department submitted a list of questions on the report to FairPoint
September 4, 2008	microDATA offered a report on the outage
September 7, 2008	FairPoint offered a "9-1-1 Event-Post Mortem" report
September 8, 2008	FairPoint representatives met with the Department and the E911 Board
September 10, 2008	The E911 Board released an "After-Action" report
September 12, 2008	FairPoint provided responses to the Department first set of questions
September 12, 2008	The Department submitted a second set of questions to FairPoint
September 24, 2008	FairPoint provided responses to the second set of questions
September 29, 2008	FairPoint provided supplemental responses to the second set
September 29, 2008	The Department met with the E911 Board staff
October 2, 2008	The Department conducted a conference call with FairPoint subject matter experts to make further inquiries about the FairPoint responses
October 10, 2008	FairPoint provided additional supplemental responses
October 22, 2008	FairPoint provided additional supplemental responses
October 22, 2008	The Department conducted a conference call with FairPoint and Verizon.
December 1, 2008	The Department prepared a Comments Draft of this report and submitted it to the primary parties involved for input. This included the Vermont E911 Board, FairPoint and Verizon
December 18, 2008	The Department released the final public draft of this report

ROOT CAUSE DETERMINATION

In early 2008 The Vermont E911 Board determined that the network had excessive transport facilities in place and that some of these could be eliminated to reduce expenses. The Board contemplated a reduction in channel quantities that would reduce unused call handling capability, while not sacrificing redundancy. The Board directed FairPoint to disconnect some facilities,[2] and the outage resulted from a failure to follow procedures related to these disconnection requests.

There were a number of deviations from standard procedures, some of which occurred weeks prior to the outage. If these early errors had been identified and addressed, the

[2] Each of the paths labeled A through D on Diagram 1 consisted of two independent 24-channel DS1 circuits, resulting in 48 channels per path. The Board, in consultation with FairPoint and microDATA determined that the network would have sufficient capacity and redundancy even each of these paths were reduced to a single 24-channel DS1 circuit. Therefore the Board requested that four circuits be disconnected, one on each of the paths labeled A through D.

later errors, while still troubling, would not have resulted in the outage. Conversely, if the later errors had not occurred (i.e. if procedures had been followed) the earlier errors would not have resulted in the outage.

It was not immediately apparent how the outage occurred, and in fact the early written reports offer conflicting information. The network was designed with a very high degree of redundancy, and tests and logs from previous outages indicate that the switches at the aggregation points redirected calls as described above. The information developed during this investigation indicates that the immediate cause of the failures was a specific configuration change performed during the disconnection procedure. The nature of this particular configuration change caused the calls to fail instead of being re-routed. The following explanation describes how the Department believes the outage occurred. Appendix 1 to this report offers a primer on signaling that may assist the reader.

CHRONOLOGY OF EVENTS LEADING TO THE PARTIAL OUTAGE

The E911 Board issued a disconnect notice on June 17, 2008 for the four circuits it intended to disconnect, one of the two on each of the four paths. FairPoint was concerned that the notice would not allow each side to correctly identify the circuit intended for disconnection.[3] As a result, processing the disconnection orders according to the standard procedures might result in disconnection of the wrong circuits, which could result in an outage. After discussion with microDATA and the E911 Board, FairPoint cancelled the initial disconnection order. Instead, an ad-hoc plan was devised to determine which circuits to disconnect. MicroDATA would first physically shut down four circuits at the selective router sites in Montpelier and St. Johnsbury. FairPoint would then electronically identify which circuits had been turned down, and then temporarily "busy-out"[4] all of the members of these particular circuits within the aggregation switches in Burlington and Rutland. The temporary "soft-disconnection" would allow time for parties to evaluate the situation and determine that both sides had disconnected the appropriate circuits, while still allowing for a prompt response in case of errors.[5] After the temporary busy-out period, FairPoint would then continue with the permanent disconnection process on the circuits that had been initially busied-out.

On August 12, 2008, microDATA turned down one of the two circuits on each of the paths A, B, C, and D. Everything proceeded as planned with three of the four paths. On these paths, FairPoint correctly identified the circuit turned down by microDATA, and busied out the members of that specific circuit. Since both FairPoint and microDATA interrupted the same circuits on each of these three paths, the network topology remained unchanged, with only the call handing capacity altered.

[3] "FairPoint recognized that "there was enough ambiguity in the disconnect order to raise concerns that the wrong circuits would be taken down" E911 Board "After-Action" report, page 2.
[4] According to FairPoint, "Busy out [and soft-disconnection] means that the trunks (DS0 level) are still in the switch, however they are made unavailable for traffic in the switch." Apparently this process makes the individual circuits appear to the switch to be busy, and is analogous to an off-hook status for line signaling.
[5] It appears that a soft-disconnection is simpler to remove than re-installing a circuit after a complete disconnection has been performed.

However, on path A, FairPoint mistakenly busied out the members of the wrong circuit.[6] At this point, each path consisted of two circuits. Since microDATA had interrupted one of the circuits, and FairPoint busied the members of the other, this effectively interrupted all of the channels on that path. This could have resulted in an immediate outage if the network did not have redundant routes in place. The routing rules in the switch require the switch to attempt to route calls to the primary route (path A), and in case no channels are available, redirect service to the alternative route (path B). The configuration in the network devices[7] allowed the switch to identify that the channels on the circuit disconnected by microDATA were unavailable.[8] The switch followed the routing rules and redirected service to path B. All E911 service therefore continued uninterrupted despite the fact that all circuits on the primary path between Burlington and Montpelier were no longer available.

When microDATA turned down the four circuits, this generated circuit status alarms.[9] However, it appears that there is no comprehensive practice to monitor alarms of this type. Furthermore, since microDATA had intended to turn down four circuits, even if a monitoring system had been in place, the alarms may not have been interpreted as a problem. While Verizon does have a comprehensive monitoring system in place, this system looks for problems with line signaling and not circuit status signaling.[10] Line signaling alarms are generated when a switch experiences difficulty placing calls. Since all of the channels on path A appeared busy, the switch just redirected the calls and never experienced difficulty placing calls. Therefore, no line signaling alarms were generated.

As the OCO, Verizon was responsible for the final approval of the disconnections. During the busy-out period, FairPoint made repeated inquiries with microDATA (apparently on Verizon's behalf) about whether to proceed with the final disconnection. On September 3, 2008, after conferring with Fairpoint (and apparently not the E911 Board), Verizon authorized the final disconnection of four circuits. This included all four circuits microDATA had originally turned down, and not the one mistakenly busied out by FairPoint. Approval by Verizon led to disconnections by FairPoint technicians.

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[6] Trunk group TG798 from Burlington to Montpelier consisted of 2 DS1 circuits, 8501 and 8502, each with 24 members. The entire DS1 composing 8502 was physically disconnected by microDATA in Montpelier, but FairPoint busied out the individual channels composing 8501 in Burlington.

[7] All of the circuits on paths A-E are routed through a networking device called a Digital Cross Connect System, colloquially called a DACS. These devices are used for grooming, or mapping communications channels from one communications circuit to another.

[8] When microDATA turned the DS1 down in Montpelier, the DACS detected the loss of the circuit status signaling. Even though all of the individual channels were mapped from the microDATA port to the switch port, the circuit status signaling was not. However, the loss of the microDATA DS1 caused the DACS to disable that entire DS1 port. This in turn caused each individual channel on that port to enter an "off-hook" status. The mapping configuration in the DACS caused the line signaling to draw the "off-hook" status from each channel and relay this information to the switch.

[9] The DS1 circuits turned down by microDATA were connected to the Burlington DACS. When the circuits were turned down, the DACS would have sensed the loss of the circuit status signaling channel and generated an alarm.

[10] The Verizon Network Fault Monitoring (NFM) system monitors individual channels as they pass through the DACS. Specifically the system detects Machine Detected Interoffice Irregularity (MDII) errors, indicating wink-start failures on circuits using CAMA MF R1 line signaling.

The final disconnection of the circuits on paths B, C, and D proceeded as planned: FairPoint disconnected the three circuits that had already been disconnected on the microDATA side and busied out on the FairPoint side. The final disconnection of these three circuits therefore had no noticeable effect. However, the specific nature of the disconnection of the circuit on path A interfered with the process that had allowed the switch to determine that the channels were unavailable.[11] When the configuration change was made, the switch was no longer able to receive the indication that microDATA had turned down the circuit on path A. Instead, all of the channels now appeared available. The switch followed the routing rules and directed all traffic to those channels. However, since the channels were not connected to anything, calls routed to these channels simply stalled. The switch attempted to pass the call on one channel, waited a specified time, and then moved on to another channel. The switch moved sequentially through each channel on the circuit, attempting in vain to pass the calls.

The fact that calls were stalling was identified by the Verizon monitoring system,[12] and Verizon arranged a conference call to isolate and resolve the problem. Service was eventually restored when the soft-disconnect was removed from the members of the circuit on path A that had been busied out by mistake on August 13, 2008. Since this circuit had always been available on the microDATA side, rectifying this original error allowed traffic to being flowing again.

[11] The disconnections were implemented through the removal of the DACS cross-connection configuration, also referred to as mapping. When these configuration changes occurred, the device could no longer draw the off-hook status from the channels on the out-of-service ports. It appears that in a default configuration, that is, when no cross-connect configuration in place, the DACS provides "idle" status to individual channels connected to it. Since the 5ESS port for DS1 8502 was still connected to the DACS DS1 port, the 5ESS received a normal DS1 ESF channel, and the default "idle" status on each individual channel.

[12] MDII errors were detected in the Verizon NFM system when calls were attempted on 8502. The 5ESS switch attempted to initiate calls and after failing to receive the required wink from the opposite end, sequentially moved through the channels in the group, generating errors as it moved through them.

PRIMARY CONCLUSIONS

The fundamental technical problem that led to the partial outage was that the circuit on path A was disconnected in the DACS while the individual channels that ride on the circuit were still active members of the primary route in the switch. In fact, it was precisely the removal of the DACS mapping configuration that caused the outage; disconnection at any other point would have allowed the signaling to function correctly and re-route traffic. FairPoint deviated from standard procedures to implement the disconnections. It appears that these deviations were contributing factors to the partial outage.

All parties might have noticed that no traffic was being routed to Montpelier following the initial busy-out process on August 12. It is especially surprising that no one did, since one of the key justifications for the ad-hoc disconnection process was to allow time for everyone to notice and respond to such errors.

The Department has identified 9 errors that contributed to the outage, and these are listed below, divided into two groups, those that preceded the day of the outage, and those that occurred on the day of the outage.

ERRORS PRECEDING THE OUTAGE

1. The description of the circuits connecting the aggregation switches to the selective routers contains confusing nomenclature.[13] This was compounded by the discovery that the cables for certain circuits installed by Verizon prior to FairPoint's acquisition were improperly labeled.

   If the records had been in better order then there would have been less inclination to deviate from the procedures and perform the disconnection ad-hoc.

2. FairPoint did not follow a standard administrative procedure in processing the disconnection requests.[14]

   If FairPoint had followed a standard procedure to disconnect the circuits this may have reduced the likelihood of errors.

3. FairPoint busied-out the incorrect circuit on August 12, 2008.

   FairPoint has acknowledged this error, which likely resulted from the failure to follow procedures, error #2. If FairPoint had busied out the correct circuit then the later errors would not have resulted in an outage.

[13] Each path on diagram 1 was composed of two circuits. The E911 Board understood that these were identified as 8501 and 8502. The list of circuits attached to the contract identifies 7 circuits with 8502, and only 1 with 8501.

[14] There does not appear to be any documented administrative disconnection procedure that authorizes the identification of circuits for disconnection by a manual means instead of through formal written notification.

4. microDATA did not detect that traffic was not flowing to Montpelier during the test period following August 12, 2008, even though microDATA agreed to monitor the circuits to detect irregularities.

   If it had been detected that no traffic was arriving in Montpelier then error #3 could have been identified and rectified before E911 service was interrupted.

5. The E911 Board did not detect the unexpected traffic flow, nor did it require a status report from microDATA.

   If the Board had required reports about the status of the process then it is likely that microDATA would have performed a more detailed analysis during the testing period, and therefore identified the problem.

ERRORS ON THE DAY OF THE OUTAGE

6. FairPoint did not follow procedure to coordinate with microDATA and/or the E911 Board during the final disconnection.[15]

   If FairPoint had been in touch with microDATA and/or the E911 Board on the day of the final disconnection then error #3 may have been identified, or responded to more promptly.

7. Verizon authorized circuit disconnections without explicit approval from the E911 Board or microDATA.[16]

   If Verizon had been in direct contact with microDATA and/or the E911 Board, error #3 may have been identified.

8. FairPoint authorized Verizon to perform circuit disconnections (which led to the immediate removal of the DACS configuration by FairPoint technicians) without first ensuring that that the individual channels were removed from the switch trunk group.[17]

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[15] Voice Network Creation and Provisioning document WI 2301.305.277 requires obtaining customer approval to remove trunks from service. It appears that FairPoint was in regular communications with microDATA regarding the pending permanent disconnection prior to September 3, 2008. In fact, FairPoint appears to have contacted microDATA on September 2, 2008 for final confirmation to proceed. Nevertheless, FairPoint was not in contact with microDATA or the E911 Board during the actual procedure on September 3, 2008.

[16] As the Overall Control Organization (OCO), Verizon is responsible for final authorization for changes to circuits affecting E911 service. On the disconnect order due date, September 27, 2008, Verizon did not call microDATA to advise that the trunks were going to be removed from the switch. Verizon instead called FairPoint to determine if the circuits should be disconnected.

[17] WI 2301.305.277 indicates that circuits should be removed from service by removing the members from the trunk group in the 5ESS switch. It does not discuss disconnecting the circuit by removing the trunk configuration from the DACS.

If the members of the trunk group had been removed from the group before the circuit was disconnected then the normal routing rules would have allowed the outage to be avoided.[18]

9. FairPoint did not follow the documented procedure in responding to the outage.[19]

   If this procedure had been followed then the duration of the outage could have been minutes and not hours.

Errors 3, 4, and 5 have been documented in the post-mortem reports issued by FairPoint, microDATA, or the E911 Board. Error 7 was disclosed in a FairPoint response to a Department question. Errors 1, 2, 7, 8, and 9 these have not been specifically stated in reports or responses to the Department on these subjects. Nevertheless the Department believes that the documents indicate that these errors in fact occurred.

[18] Had the original error of busying out the members of the incorrect circuit (#3 above) been identified and addressed, error #8 would not have resulted in the outage. Nevertheless, it would still have been a procedural error to disconnect a circuit prior to removing the members from the trunk group.

[19] Verizon Network Control Center document NCC2199WI specifies that the first course of action upon noticing MDII errors is to remove the members from the trunk group. This action would cause the switch to implement the routing rules to redirect traffic to other routes.

RECOMMENDATIONS

Review E911 procedures. FairPoint should develop new procedures to be implemented after cutover that will involve the E911 Board and the E911 system operator in any network changes. The E911 Board should play a role in defining these procedures. The Department has asked a consultant[20] to review FairPoint's new business processes as a part of the ongoing review of FairPoint's preparations to replace services Verizon is providing to FairPoint under the TSA. On September 19, 2008, the E9-1-1 Board instituted a new change management procedure focused on improving communications between parties working on the 9-1-1 system. This procedure ensures that all parties participating in work on the 9-1-1system are aware of the scope of work, when it is to take place and the risks and mitigation strategies associated with the work.

Review disconnection procedures generally. FairPoint post-cutover procedures should clearly identify the OCO[21] or the equivalent. They should also clearly indicate that individual channels should be removed from a trunk group before circuits are disconnected, and should identify the role of the OCO in communicating with the customer during this process.

Consider changing the signaling system. The CAMA signaling protocol is used to pass caller information between the aggregation switch(s) and the selective routers. While this system is robust enough to pass the information required for E911 service, it is based on an older generation of technology referred to as "in-band"[22] signaling. In fact, it is likely that the outage would not have occurred had the network relied upon more modern "out-of-band" signaling protocol such as ISDN or SS7[23]. However, there may be valid reasons for staying with the existing CAMA signaling, and in this case, perhaps the CAMA vulnerability can be reduced by moving the IP gateways closer to the aggregation switches. The E911 Board should determine if out-of-band signaling can be implemented on the selective router trunks, and whether this offers any benefits.

Analyze selective router location. The disassociation of the selective routers from the aggregation points[24] created the potential for this outage, and outages like it, to occur.

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[20] Liberty Consulting is advising the Department regarding FairPoint's preparedness for cutover to the new FairPoint systems. The Department has requested that Liberty review FairPoint's proposed new procedures regarding E911 services.

[21] Overall Control Organization, described above.

[22] Line and register signaling can be performed together either "in-band" "out-of-band". In-band line signaling travels with the channel as it passes through network devices. Out-of-band line signaling may be delivered as one of the 24 channels of the DS1, or may be sent on a completely independent path.

[23] This outage resulted from the interruption of the channels in the DACS while they remained active in the switch trunk group. Had out-of-band signaling been in place, the interruption of the channels would have also interrupted the signaling "D" channel, and thus the 5ESS switch would have identified the channels as busy and rerouted the calls.

[24] Selective routers are often co-located with aggregation switches. The Vermont E911 Board determined that the functionality of the selective router, specifically maintaining an address database and routing calls according to this database, could be provided by independently from the aggregation services. In February 2007 microDATA began offering these services as an independent contractor for the E911 Board.

This potential was recognized, and precautions were made to reduce the risk of these outages; specifically, redundant paths were created from each aggregation point to each selective router. While these actions were indeed appropriate, it may be more appropriate to simply co-locate the selective routers at the aggregation switch sites.

As a result of its own investigation, the E911 Board is in the process of moving components of the selective router(s) to the aggregation switch sites. Specifically, the Board is moving the IP gateways to the Aggregation Points. This will minimize the vulnerability of created by the use of the CAMA signaling system.

Review the selective router circuit design. The FairPoint circuit design routes each of the DS1 circuits connecting the aggregation switches to the selective routers through DACS devices co-located with the aggregation switches. The inclusion of this additional device in the circuit design increases the potential for failure, but appears to have some benefits as well.[25] Therefore, the FairPoint and the E911 Board should investigate the possibility, benefits, and consequences of eliminating the DACS from the circuit design. Discussions about these changes have already taken place between the E911 Board and Fairpoint.

Consider modifying network monitoring systems. FairPoint monitors line signaling errors, but does not actively monitor circuit status of the T1 trunks. It appears that neither microDATA nor the E911 Board have an active monitoring system for either line signaling errors or circuit status errors. The E911 Board should consider implementing monitoring systems for line and circuit errors, and should also consider requiring FairPoint to modify its monitoring practices.

[25] Since a DACS device terminates circuit status signaling instead of mapping it through from port to port, the DS1 alarm status cannot be fed directly to the 5ESS switch responsible for routing determinations. However, it appears that the Verizon Network Fault Monitoring system is designed to identify MDII errors by monitoring individual channels passing through the DACS. Verizon and FairPoint have indicated that there is currently no comprehensive system to monitor alarms on DS1 ports, or specific channels within the 5ESS switch. This indicates that routing circuits through the DACS is advisable precisely because it allows the monitoring system to function.

APPENDIX 1: SIGNALING PRIMER

In order for any telephone call to be routed to its final destination, the devices carrying the call need to communicate with each other. The components of the telephone network use several different communications techniques to achieve this result, but these are all referred to generally as "signaling". There are three fundamental types of signaling: line signaling, register signaling, and circuit status signaling.

Telephone switches rely upon line signaling to monitor and administer individual telephone channels. Initiating a telephone call relies upon *line signaling*[26]. A call is initiated when a switch seizes a channel, which is essentially the digital equivalent of taking a telephone handset off-hook. When the distant switch senses a change to off-hook status, it provides an acknowledgement that the initiating switch may proceed to send the desired digits through *register signaling*[27]. This acknowledgement is roughly equivalent to listening for dial tone. Line and register signaling require that there be a clear, unobstructed communications channel between the initiating and receiving switches. If this is interrupted, the switches cannot administer calls.

Line signaling and register signaling do not communicate anything about the quality of the transport mechanism connecting the switches; they require and assume a clear, quality channel. Since many channels travel on the same path and line signaling is specific to an individual channel, it would not be efficient to use line signaling to monitor channel quality. In fact, individual telephone channels are combined together in groups of 24 channels, and the aggregated group is referred to as a DS1. *Circuit status signaling*[28] is a mechanism used by devices that carry DS1 circuits to monitor the quality of the circuit that is carrying the individual channels.

There is some interplay between line signaling and circuit status signaling. For example, if a device detects irregularities through circuit status signaling channel, it will place all of the individual channels on the port connected to that DS1 into a busy or "off-hook" status. This would make the channels unavailable, and would trigger the switch to implement alternative routing rules.

Line signaling is by its very nature end-to-end. That is, the information must pass from the originating to the terminating switch regardless of what other network devices the channel passes through. This is not necessarily the case with circuit status signaling. Many, if not most, network devices pass circuit status signaling information along through the transport route along with the channels themselves. However, some network devices are designed to merge channels from different DS1 circuits together[29]. This is

[26] Line signaling allows switches to administer individual channels, referred to Digital Signal 0, or DS0.
[27] Register signaling allows the switches to communicate the digits required to complete the call.
[28] Each Digital Signal 1, or DS1, in addition to the 24 separate 64 kbps channels (1536 kbps), also includes a separate 8 kbps Extended Superframe Format (ESF) signaling channel (1544 kbps total). This channel allows switches to communicate the status of the discrete physical links.
[29] One example is a Digital Cross Connect System, colloquially called a DACS.

accomplished by mapping individual channels between various DS1 ports. In this case, line signaling passes with the channels, but circuit status signaling does not.

Circuit status signaling must cover a discrete path, and it is impossible to merge these signaling channels from two circuits together. Instead circuit status signaling information terminates on the various DS1 ingress ports, and then new un-related circuit status channel signaling channel is generated on the egress port. This means that a failure of a circuit connected to one port would not necessarily be communicated to a device connected to another port, even if all of the individual channels are mapped through the device.

Although circuit status signaling may not pass transparently through such devices, an interesting interplay between line signaling and circuit status signaling can nevertheless allow a switch to detect problems. If a network device experiences circuit status signaling problems on a particular port, this can cause the device to place the port in an out-of-service state. When this occurs, each of the individual channels will be placed in the out-of-service state as well. Any channels mapped from other ports to the out-of-service port will receive a "busy", or off-hook status. This information will be passed through the network via line signaling. Therefore, even though the circuit status signaling may not pass directly through these devices, if the mapping configuration is correct, the existence of the problem will nevertheless be transmitted via line signaling.