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April 26, 2017

Ex Parte

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: **Rural Call Completion, WC Docket No. 13-39**

Dear Ms. Dortch:

Attached please find the materials Verizon presented at its second rural call completion workshop on March 29, 2017. At the workshop, we discussed the findings of numerous investigations into low call answer rates. We explained that our investigations into OCNs with low call answer rates have rarely resulted in identification of network or technical issues, and have not yet identified any instance of fraudulent or illegal conduct by a downstream intermediate provider. So far, the most effective means of identifying and resolving call completion issues has been through investigation of specific complaints we receive through our rural call completion hotline or directly from the FCC, which include details such as the date, time, and nature of the problem and the phone numbers involved.

As discussed at the workshop and reflected in the attached materials, autodialer traffic and calls to unassigned numbers have an impact on answer rate metrics for a variety of reasons. Autodialers are a significant driver of unanswered calls in part because autodialers place significant volumes of calls to numbers that are not in service (unassigned). Similarly, calls to unassigned numbers impact answer rate because such calls are unanswerable.

In addition, release cause codes may not be a reliable indicator of call treatment or the end user's experience. For example, release cause codes do not reliably identify all calls to unassigned numbers. Many call attempts to unassigned numbers result in a release cause code of something other than a "1." And notably with regard to the FCC's current Form 480 reporting process, carriers are permitted to self-define the categories of calls reported as answered, busy, unassigned, and ring-no-answer. This calls into question the comparability of data across carriers and potentially undermines the utility of the data currently collected.

Marlene H. Dortch
April 26, 2017
Page 2

We recommend that the FCC analyze the data it will receive through the first quarter of 2017 to determine if it is producing the intended benefit. If it is not, then the FCC should eliminate the reporting requirement. If the FCC decides to retain the current reporting requirements, it should refrain from extending those requirements in any respect (for example to any additional carriers), nor should it modify the reporting requirements without a robust notice and comment period with ample opportunity for industry engagement. In the meantime, the FCC should issue the clarifications of the rural call completion safe harbor described in Verizon's ex parte filing of February 23, 2017. This will eliminate the burden of reporting and extended record retention for carriers that are willing to restrict their use of intermediate providers for calls to rural carriers.

Sincerely,
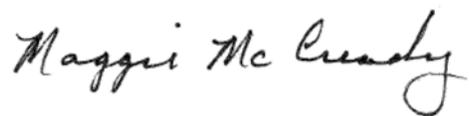
Maggie McCready

Attachment

cc: Daniel Kahn
        Nirali Patel
        William Andrle

Rural Call Completion

Industry Workshop II

March 29, 2017

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Rural Call Completion Industry Workshop

Welcome!

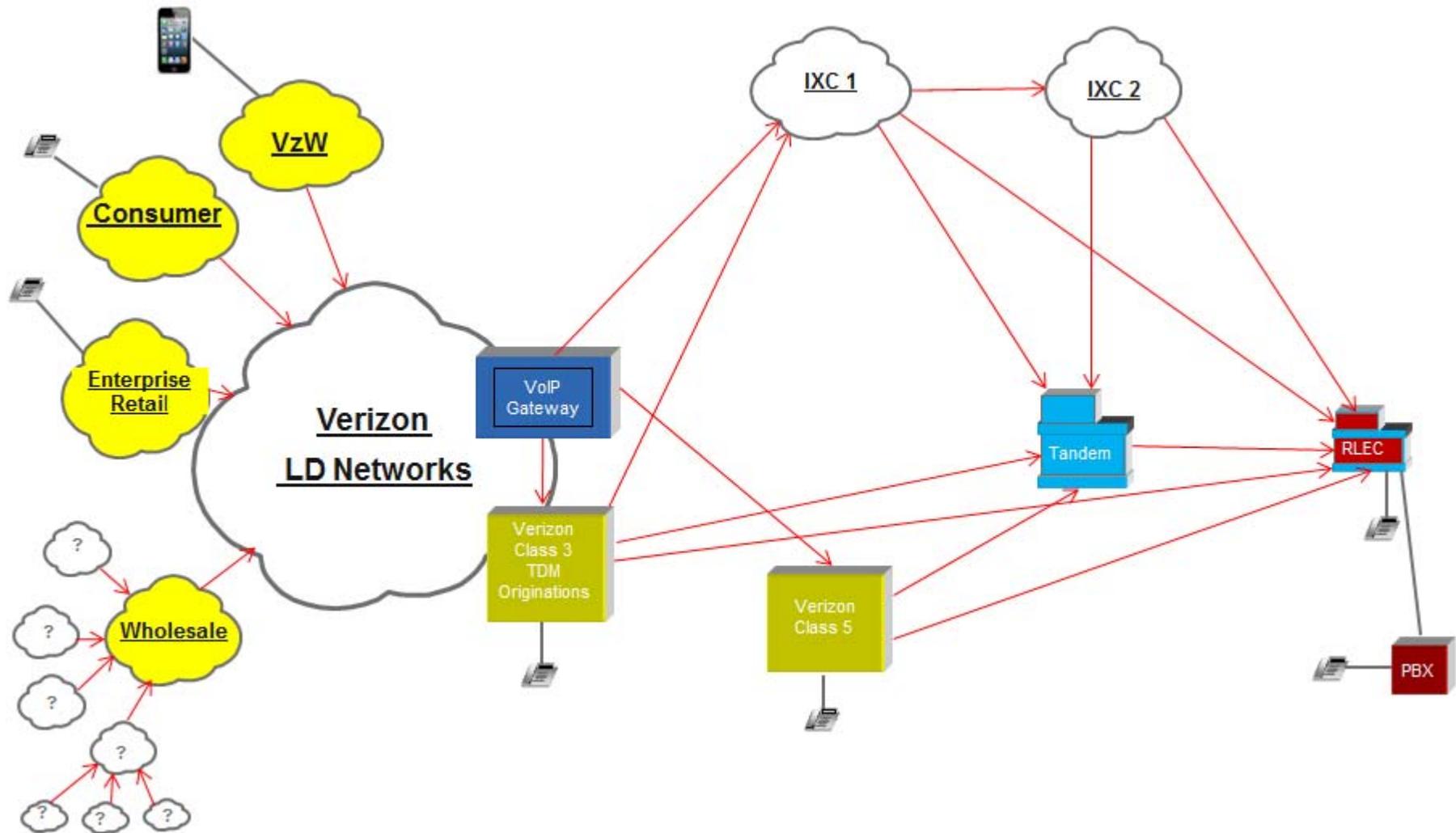# Rural Call Completion Industry Workshop – Panel Discussion

- **Limiting Use of Intermediate Providers**

- **Investigative Activities**

  - ASR investigations

  - Re-origination

  - Calling Party Number manipulation

  - Milliwatt testing

  - New metrics: Repeat Attempts Metric (RAM)

- **Responses to Complaints**

  - Overview of complaint-driven activities

  - Review of selected investigations

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Rural Call Completion Industry Workshop – Panel Discussion

Limiting Use of Intermediate Providers for Calls to Rural ILECs

- Verizon implemented changes in its routing of calls to Rural ILECs.

- Verizon requires its intermediate providers to contractually agree to utilize no more than one additional carrier in routing before the call is delivered to the RLEC or the tandem for termination.

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Rural Call Completion Industry Workshop – Panel Discussion

Rural Call Completion Industry Workshop – Panel Discussion

Answer Rate (ASR) Investigations

- **Metric: Answered Calls / (Total Attempts – Attempts to Unassigned Numbers)**

  - Answered call is a call that receives an answer message and a normal release cause code.

  - Attempts to Unassigned Numbers means call attempts with release cause code of 1.

- **Scope:** Call attempts to all OCNs designated as rural on the annually updated list published by the National Exchange Carrier Association (NECA).

- **Two types of triggers**

  - Monthly Low ASR: OCNs for which the Call Answer Rate fell below 80% of the Aggregate Rural Answer Rate in the prior month.

  - Next-Day Negative Spike: OCN with an Answer Rate that is one third or less of its 35-day rolling average Answer Rate for two consecutive days.

- **Up to Twenty Investigations Per Month**

- **Did not filter out autodialer traffic**

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Rural Call Completion Industry Workshop – Panel Discussion

Overview of ASR Investigations

- **Time Period**

  - April 2015 through December 2015

  - Total Number of Investigations: 202

    - Low ASR: 176

    - Negative Spike: 26

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Rural Call Completion Industry Workshop – Panel Discussion

Overview of Low ASR Investigations

Signaling Practices	OCNs	%
Cause Code 1 in ACM	30	
Unexpected RWC	83	
EO Non-SS7	22	
		77%
Calling Patterns		
Autodialer	11	
Mass Call	7	
Single number	2	
		11%
Other		
Translations	1	
Verizon Network	1	
No Issue Found	8	
Misc	1	
End Office outage/isolation	10	
		12%
Total	176	100%

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Rural Call Completion Industry Workshop – Panel Discussion

Overview of Negative Spike Investigations

- 26 OCNs tripped the Negative Spike metric.

Outage/SS7 Isolation in RLEC Network	7
Autodialer Event	6
Mass Call Event	5
Single Number Issue	5
End Office not SS7	1
Incorrect Release Message	1
No Issue Found	1
Total	26

- 73% of negative spikes were due to calling patterns.

- When we contacted the RLEC for the 7 RLEC network events, the RLEC was already aware of the event (internal alarms, etc.). These were power, transport, or switch outages.

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Observations

- **OCN vs. CLLI (end office)**

  - 47% of OCNs had 2 or more CLLIs (end offices)

  - 17% of OCNs had 5 or more CLLIs (end offices)

  - A low ASR for an individual CLLI can drag down an entire OCN

  - A high ASR for an OCN can mask a low ASR for an individual CLLI

- **Autodialer Activity**

  - Autodialer activity impacts answer rate (autodialers are a significant driver of unanswered calls).

- **Unassigned Numbers**

  - Calls to unassigned numbers impact answer rate (calls to unassigned numbers are unanswerable).

  - Release cause codes cannot be used to reliably identify all calls to unassigned numbers. Many call attempts to unassigned numbers result in a release cause code of something other than 1.

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Rural Call Completion Industry Workshop – Panel Discussion

Autodialer Activity

- **Types of Autodialers**
    - Public service (weather alerts; school closings; etc.)
    - Telemarketing activity
    - Political / Campaign calling activity
- **Volume of Autodialer Activity**
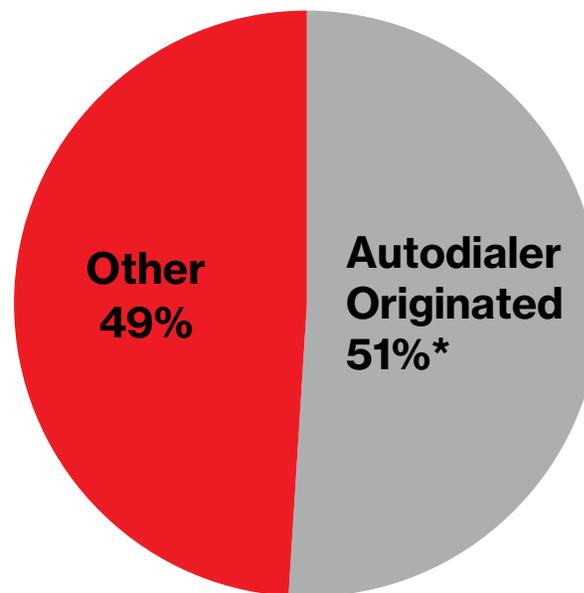
Pie chart:
- Other 49%
- Autodialer Originated 51%*

*Based on 30-day data sample. Autodialer = Any calling number which has made >60 calls in any 1 minute period during the prior 90 days (inclusive of the investigation period).

Rural Call Completion Industry Workshop – Panel Discussion

Effect of Autodialer Traffic on ASR

- May generate multiple attempts (SIP proxy retries).

- High volumes cause network congestion, causing other non-autodialer call attempts to fail.

- Autodialers place significant volumes of calls to numbers that are not in service (can't ever answer).

- Autodialers generate call-back activity to numbers that are not in service or that otherwise don't answer.

- Autodialer campaigns are often of short duration, but can have a lingering impact; a one- or two-day autodialer event can skew the Answer Rate for a destination for the entire month.

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Calls to Unassigned Numbers

- **Unassigned numbers cannot be accurately identified solely by relying on the Cause Code in the ACM or Release Message**

- **Signaling Framework**

  - Cause Code "1" is designated by industry standards to indicate the Called Number is unassigned (not in service).

  - ACM (Address Complete Message). Sent by downstream carrier to instruct upstream carriers to open audio path. Results in caller hearing "announcement" for calls to unassigned numbers when no ANSwer message is generated.

  - ACM messages may optionally contain a cause code.

  - RELease message. Sent by carrier whose party hangs up first. Cause code is required.

  - Cause Code in ACM will differ from Cause Code in RELease message.
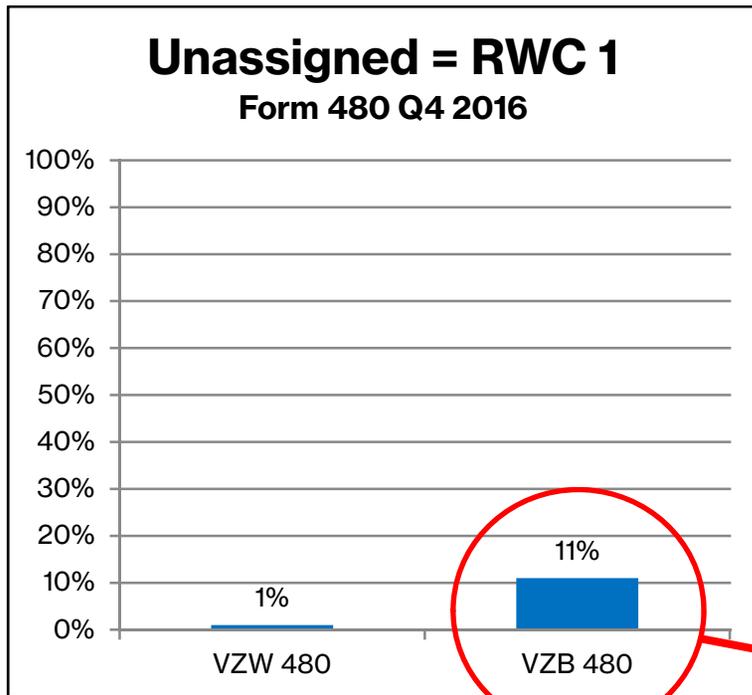
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Rural Call Completion Industry Workshop – Panel Discussion

Calls to Unassigned Numbers

- **Signaling practices observed for calls to unassigned numbers**

  - RLEC sends RWC(1). If passed back to originating carrier, originating carrier should play the announcement.

    - Sometimes tandem or IXC intercepts the RWC(1), provides an ACM upstream, and plays an announcement for the caller. Typically results in RWC(16) from originating carrier when caller hangs up.

  - RLEC sends ACM(1), and plays announcement itself. Typically results in RWC(16) from originating carrier when caller hangs up. But ACM cause code (1) indicates called number was unassigned.

  - RLEC sends ACM(blank), and plays announcement itself. Typically results in RWC(16) from originating carrier when caller hangs up. Originating carrier does not have visibility to the fact that the called number is unassigned.

  - RLEC sends cause code other than (1) in Release message (e.g., 3). Can drive different treatments or announcements in upstream networks. Originating carrier does not have visibility to the fact that the called number is unassigned.

- **Verizon contacted the RLEC on 168 investigations. 137 of those were the result of not having received a RWC (1).**
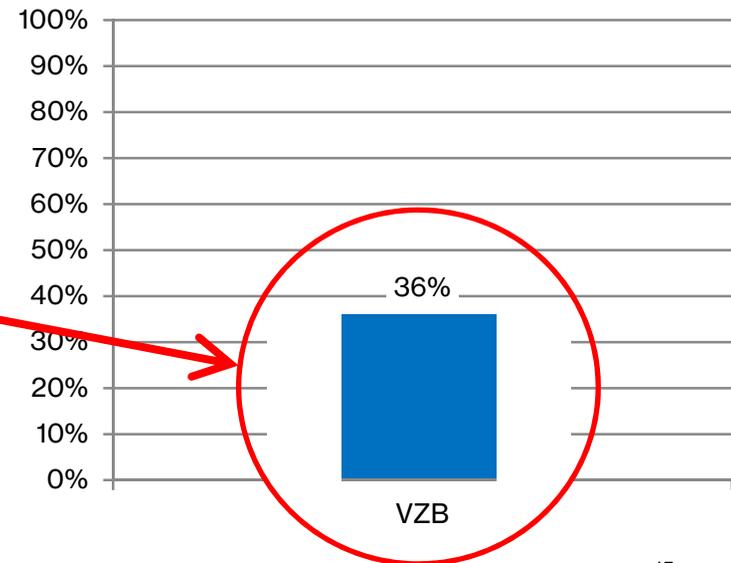
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Originating customer mix, not network or terminating destination, is what drives % of calls to unassigned numbers.
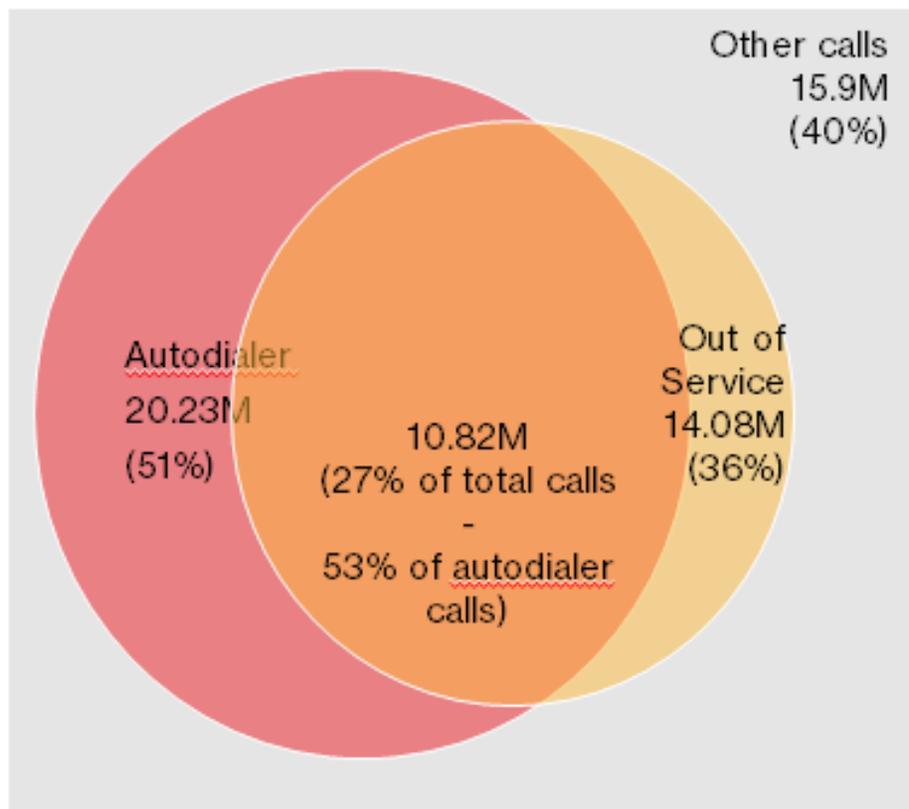
Unassigned = RWC 1
Form 480 Q4 2016

Relying solely on RWC 1 undercounts calls to unassigned numbers

Unassigned = Never answered during 90-day period
30-day data sample

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Rural Call Completion Industry Workshop – Panel Discussion

Autodialers frequently call unassigned numbers.

Other calls
15.9M
(40%)

Autodialer
20.23M
(51%)

10.82M
(27% of total calls
-
53% of autodialer
calls)

Out of
Service
14.08M
(36%)

Out of 39.43M calls in study period*:

- 51% were made by autodialers

- 36% were made to out of service (unassigned) numbers

- 27% were made by autodialers calling out of service numbers

- 53% of autodialer calls were made to out of service numbers

- 77% of calls to out of service numbers were made by autodialers

* Based on 30-day data sample. Autodialer = Any calling number which has made >60 calls in any 1 minute period during the preceding 90-day period. Unassigned = Number never answered during preceding 90-day period.

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Rural Call Completion Industry Workshop – Panel Discussion

Low Answer Rate Investigations

- **Answer Rate investigations did not identify the type of LCR activity that is suspected to be at the root of systemic rural call completion failures.**

- **We enhanced our data collection to include**

  - Address-Complete Message (ACM)

  - ACM Cause Code

  - Direction of Release Message

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Rural Call Completion Industry Workshop – Panel Discussion

Calling Party Number (CPN) Manipulation

- May be used to disguise source of call

- May be used to engage in arbitrage
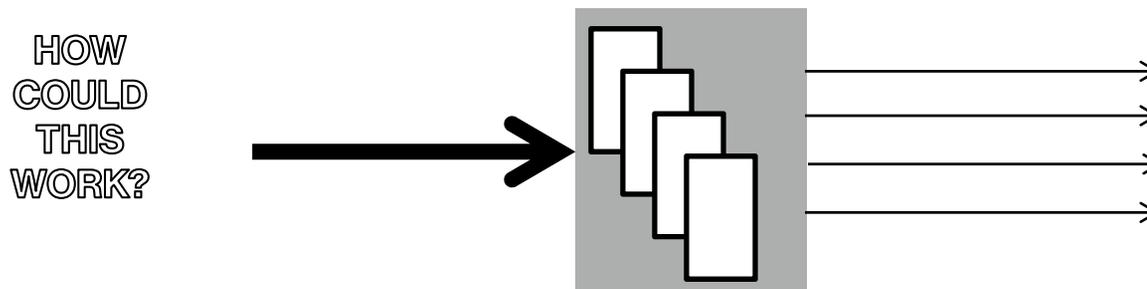

Verizon conducted investigations call re-origination

- SIMBOX fraud

- Wireline VoIP Services

Verizon conducted a CPN manipulation study

- Calling studies to try to identify instances of CPN manipulation

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Rural Call Completion Industry Workshop – Panel Discussion

SIMBOX "Re-origination"

Theory: Analytics method to look for re-originated calls using SIMBOX (VZ CDMA or VoLTE) based upon Network Data (Realtime and post-call Metadata Analytics of Billions of Records)

Model 1: *Identify Mobile Device (MDN) that generates statistically significant minutes of use to Rural Locations, cross-reference MIN/IMSI/IMEI*

> *All Calls > Only Rural Destination > Dur/Count by User > Graph Count/Dur*

Model 2: *Cell Site / Sector that generates statistically significant minutes of use: If the users weren't optimized, what about looking for cell density (Rural termination from ANY origination taking into account AYCE voice rating)...*

> *All Calls > Only Rural Destination > Dur/Count by CellSite > Graph Count/Dur*
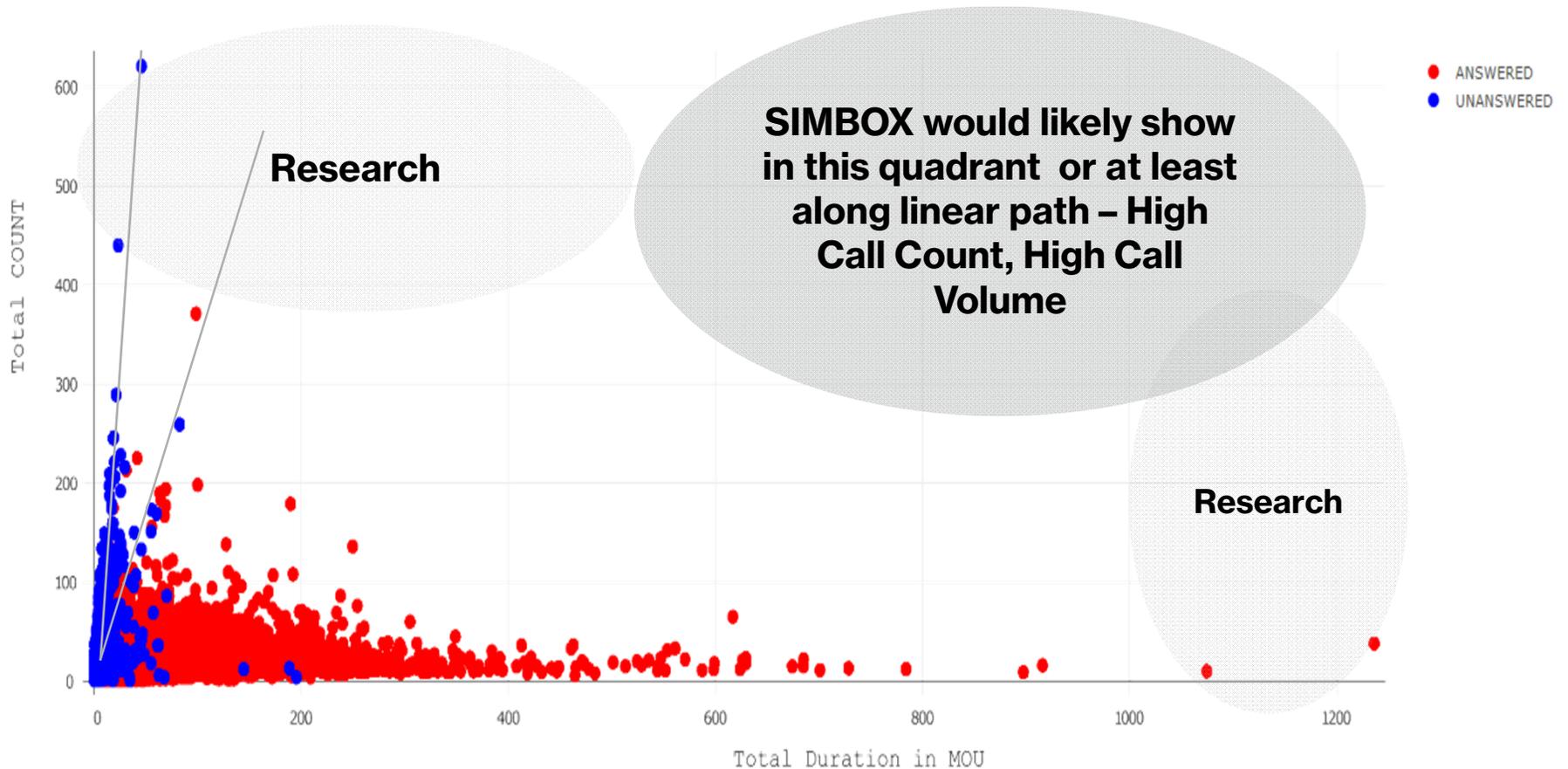
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Rural Call Completion Industry Workshop – Panel Discussion

SIMBOX "Re-origination"
Model 1 : MDN Density for Rural Call
Each "dot" is a user that called a Rural NPANXX (duration is included)

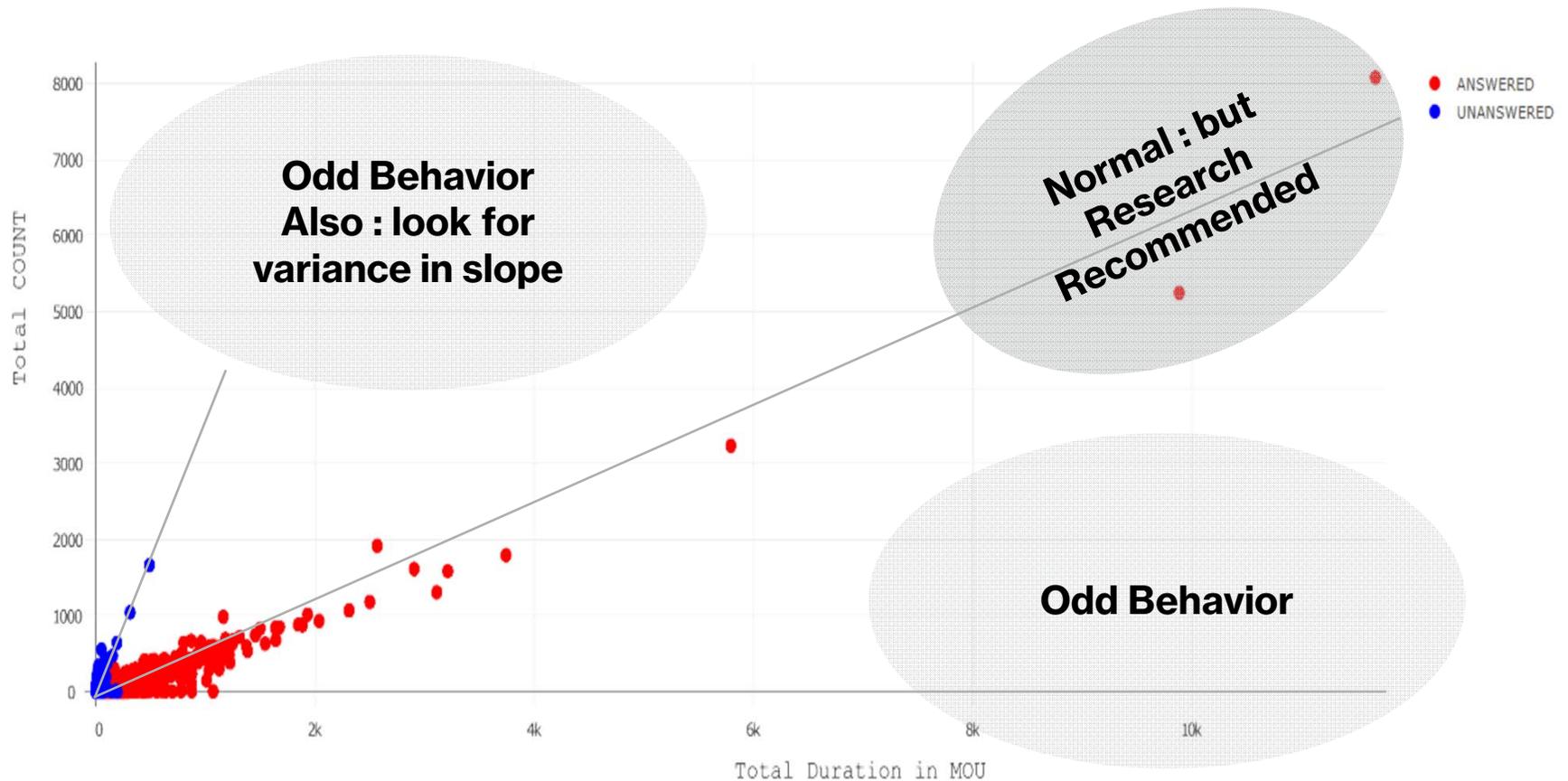VZW NPANXX DURATION (SEIZURE or ANSWER) vs. COUNT

Research

SIMBOX would likely show in this quadrant or at least along linear path – High Call Count, High Call Volume

Research

ANSWERED
UNANSWERED

Total COUNT

Total Duration in MOU

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Rural Call Completion Industry Workshop – Panel Discussion

SIMBOX "Re-origination"

Model 2 : Whole Network Cell site Density Origin calls Rural NPANXX
Each "dot" is a cell site that generated traffic to a Rural NPANXX (duration is included)

VZW SWITCHCELL DURATION BY GEOCELLSITEGRAPHY (NPANXX) AND ORIG CELLSITE

Odd Behavior Also : look for variance in slope

Normal : but Research Recommended

Odd Behavior

- ANSWERED
- UNANSWERED

Total Duration in MOU

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Rural Call Completion Industry Workshop – Panel Discussion

SIMBOX: Actual Implementation

1. Assumption: A SIMBOX is physically associated with one (1) cell tower. SIMBOX SIM cards are used to re-originate calls (new CPN) to take advantage of unlimited call plans.

2. Objective: Identify cell towers where multiple MDN's are making high volumes of calls with high volumes of minutes to Rural LEC CLLIs. 8,831 Cell Towers evaluated per week.

3. Result : 35 One-Week Evaluations Performed. No SIMBOX calling patterns found.

VZW SWITCHCELL NORTH_GREENBUSH DURATION BY GEOCELLSITEGRAPHY (NPANXX) AND ORIG CELLSITE AND MDN
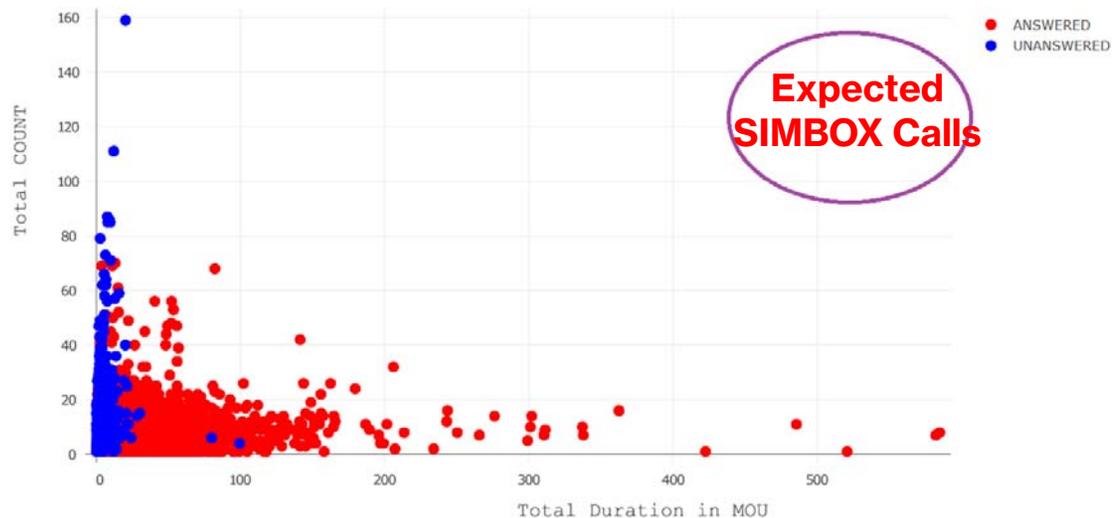
Rural Call Completion Industry Workshop – Panel Discussion

Wireline VoIP "Re-origination" (proof of concept)

**Example: Verizon Retail Small-Business Customer**

- Identified from RLEC test calls; complaint referred to Verizon

  - Test calls revealed change in caller-ID between call origination (non-Verizon Wireless handset) and terminating number (RLEC office number)

- At least seven different carriers in routing prior to Verizon

- Customer terminated by Verizon

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Rural Call Completion Industry Workshop – Panel Discussion

Wireline VoIP "Re-origination"(proof of concept)

Attempt to identify usage of a "flat rated" voice plan to "reoriginate" minutes to Rural Locations

HOW
COULD
THIS
WORK?

Other Carriers in Industry offer similar products
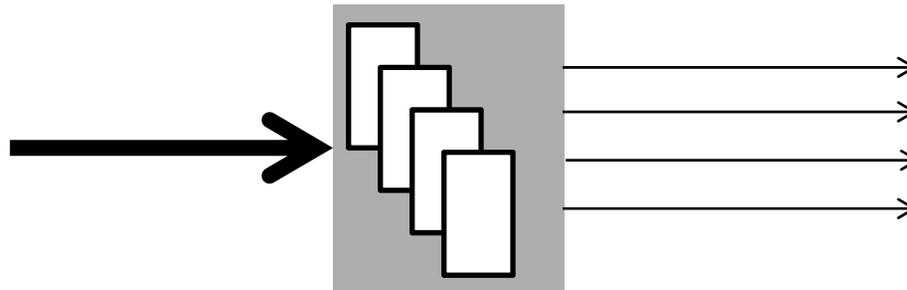
- Fios Digital Voice (Residential)
- Business Digital Voice (Small Business)
- Verizon Communications Express (Medium Business)

- Per 24HR of Realtime Signaling / CDR Records across ~6000+ NPANXX

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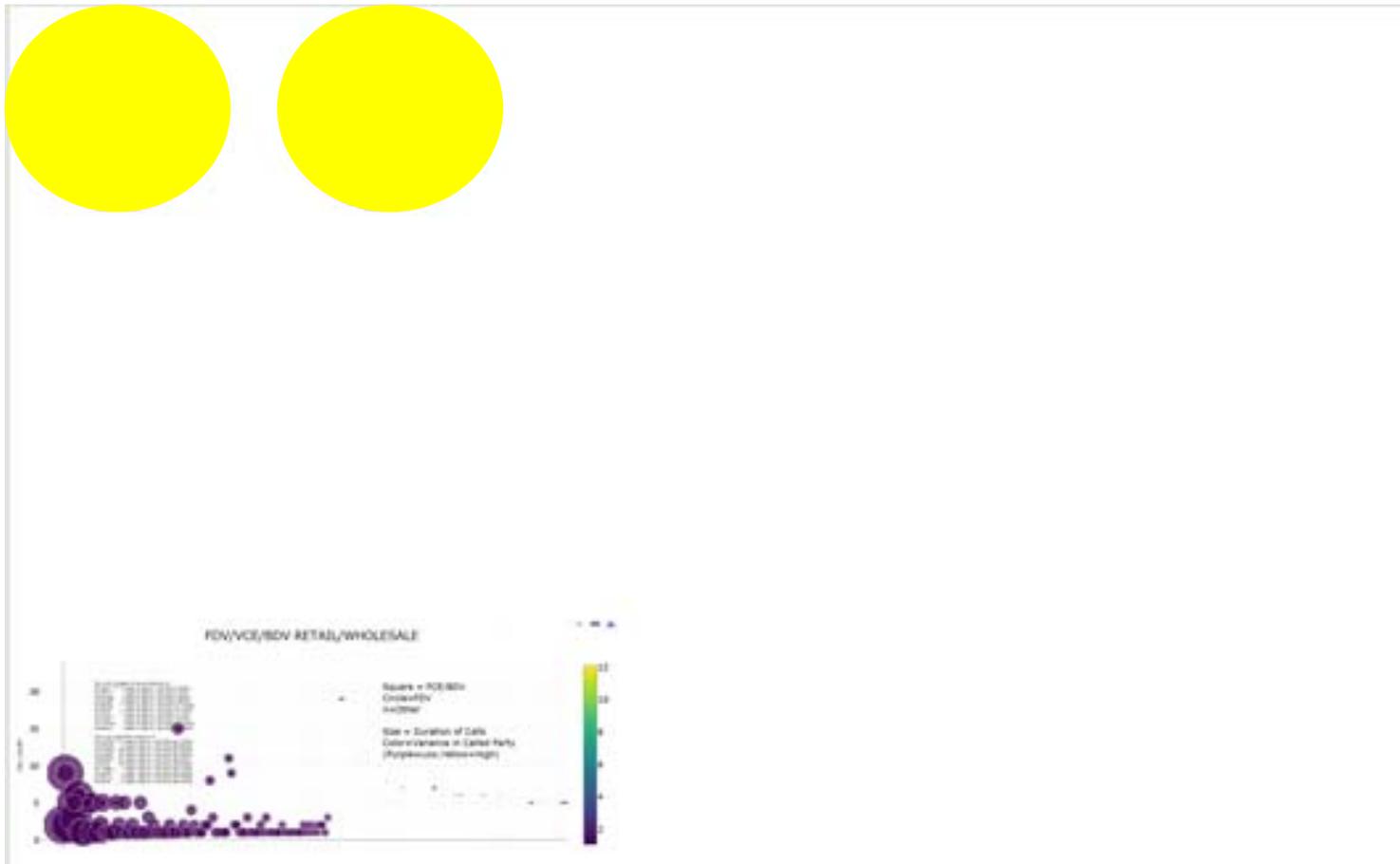# Rural Call Completion Industry Workshop – Panel Discussion

Wireline VoIP "Re-origination" (proof of concept)
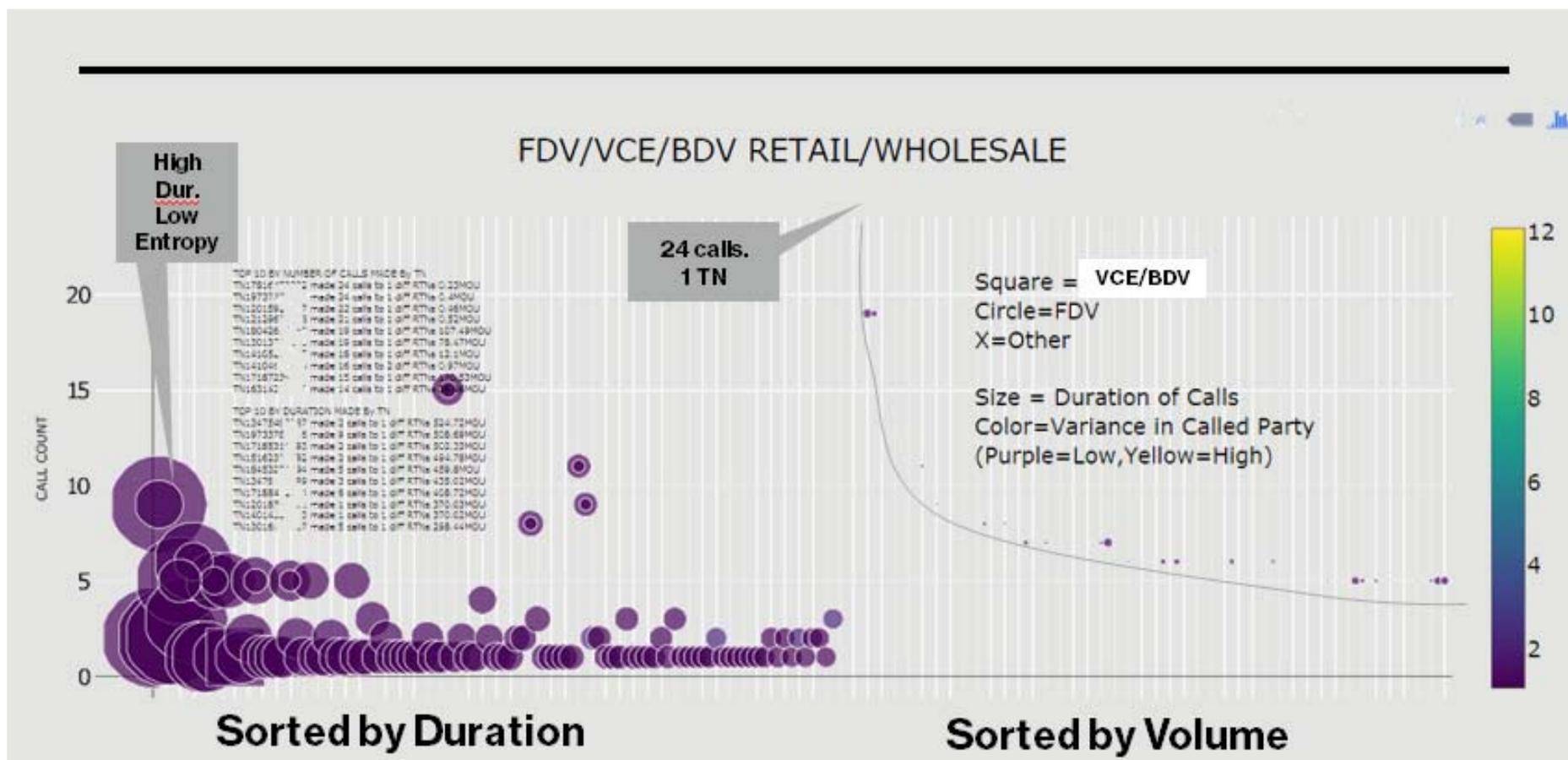
Rural Call Completion Industry Workshop – Panel Discussion

Wireline VoIP "Re-origination" (proof of concept)

- What would retail customer's behavior have looked like on our sample report?

Rural Call Completion Industry Workshop – Panel Discussion

CPN Manipulation Study

- **Originated test calls to RLEC exchanges**

- **Compared records from origination and terminating tandem**

Origination	IXC Routing / Tandem	Number of Test Calls	Number of Instances where CPN Changed
Verizon Business local network switches	Various IXCs, Third-party tandem	2,588	None
Cricket, Magic Jack, T-Mobile, Boost Mobile, Google Voice, Consumer Cellular, Skype , Straight Talk, and Verizon Wireless.	Various IXCs, Verizon tandem	15,445	One*

* CPN being changed by end-user of wholesale customer
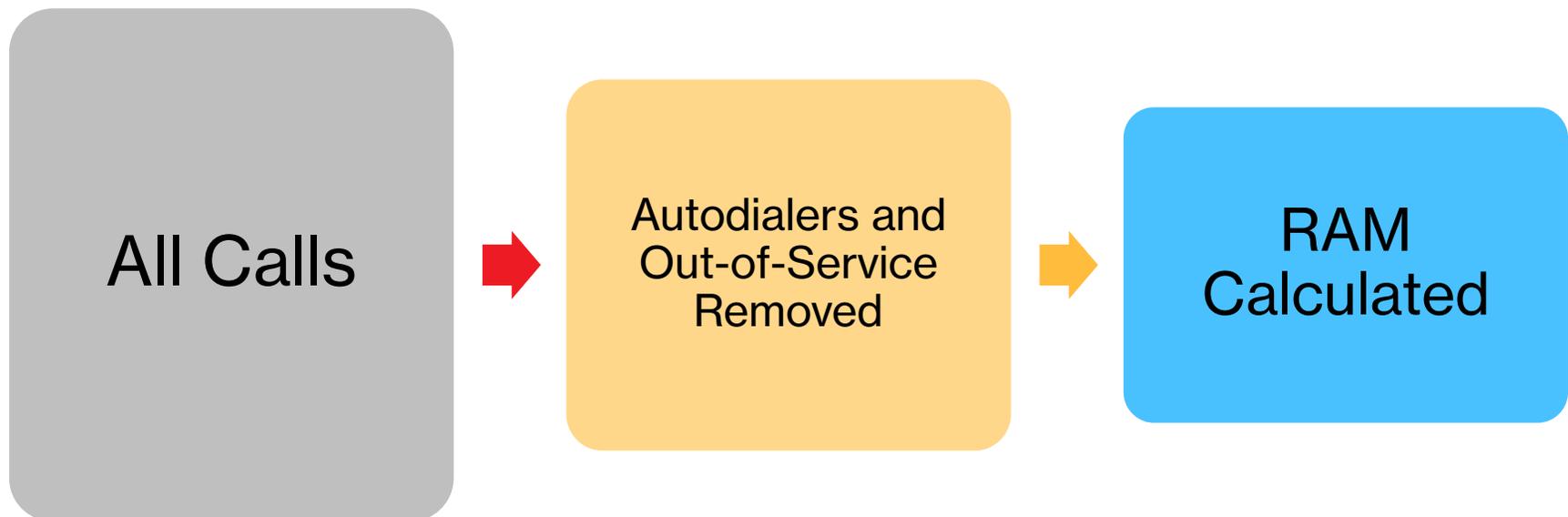
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Milliwatt Testing

- Verizon maintains website to engage in milliwatt testing with any carrier.

  - Established April 24, 2015. One request received.

  - http://www.verizon.com/about/rural-call-testing

- During the 202 ASR investigations, Verizon initially requested the RLEC to engage in milliwatt testing as part of Verizon's investigation.

  - Of the 124 RLECs from which Verizon requested milliwatt testing, Verizon was provided with valid test numbers by 53 of them.

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Rural Call Completion Industry Workshop – Panel Discussion

New Metric Being Pursued: **RAM (Repeated Attempts Metric)**

All Calls → Autodialers and Out-of-Service Removed → RAM Calculated

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Rural Call Completion Industry Workshop – Panel Discussion

RAM Data Set and Assumptions

Time Period: First 10 days of a calendar month.

OCNs in Study:

Count of OCNs by State and Carrier-Type*

	Rural		Non-Rural	
	ILEC	CLEC	ILEC	CLEC
MI	29	2	0	0
MN	76	5	1	10
WI	62	5	0	0
IA	139	10	0	0

*Sample not statistically validated.

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Rural Call Completion Industry Workshop – Panel Discussion

RAM Data Set and Assumptions

Call Volumes:

10-Day Sample*	Total Call Attempts	Autodialers	Unassigned
Oct	11.7	5.8	4.3
Nov	15	8.1	5.1
Dec	12.7	6.3	4.6
Total	39.4	20.2	14.0

*Data in millions. Sample not statistically validated.

Rural Call Completion Industry Workshop – Panel Discussion

RAM (Repeat Attempt Metric) Data Set and Assumptions

Calls (in scope) = Calls to in service numbers which are not from an autodialer

    - Autodialer = Any **CALLING #** which has made >60 calls in any 1 minute period during the prior 90 days (inclusive of the investigation period)

    - Out of Service Number (Unassigned) = Any **CALLED #** which has not answered a call during the prior 90 days (inclusive of the investigation period)

   **Repeated Attempt =** 3+ calls between two numbers occurring in a 5 minute window

    - Repeated Attempt Calls = Total # of calls made during all repeated attempts

    - Repeated Attempts Metric = Repeated Attempt Calls / Calls (in scope)

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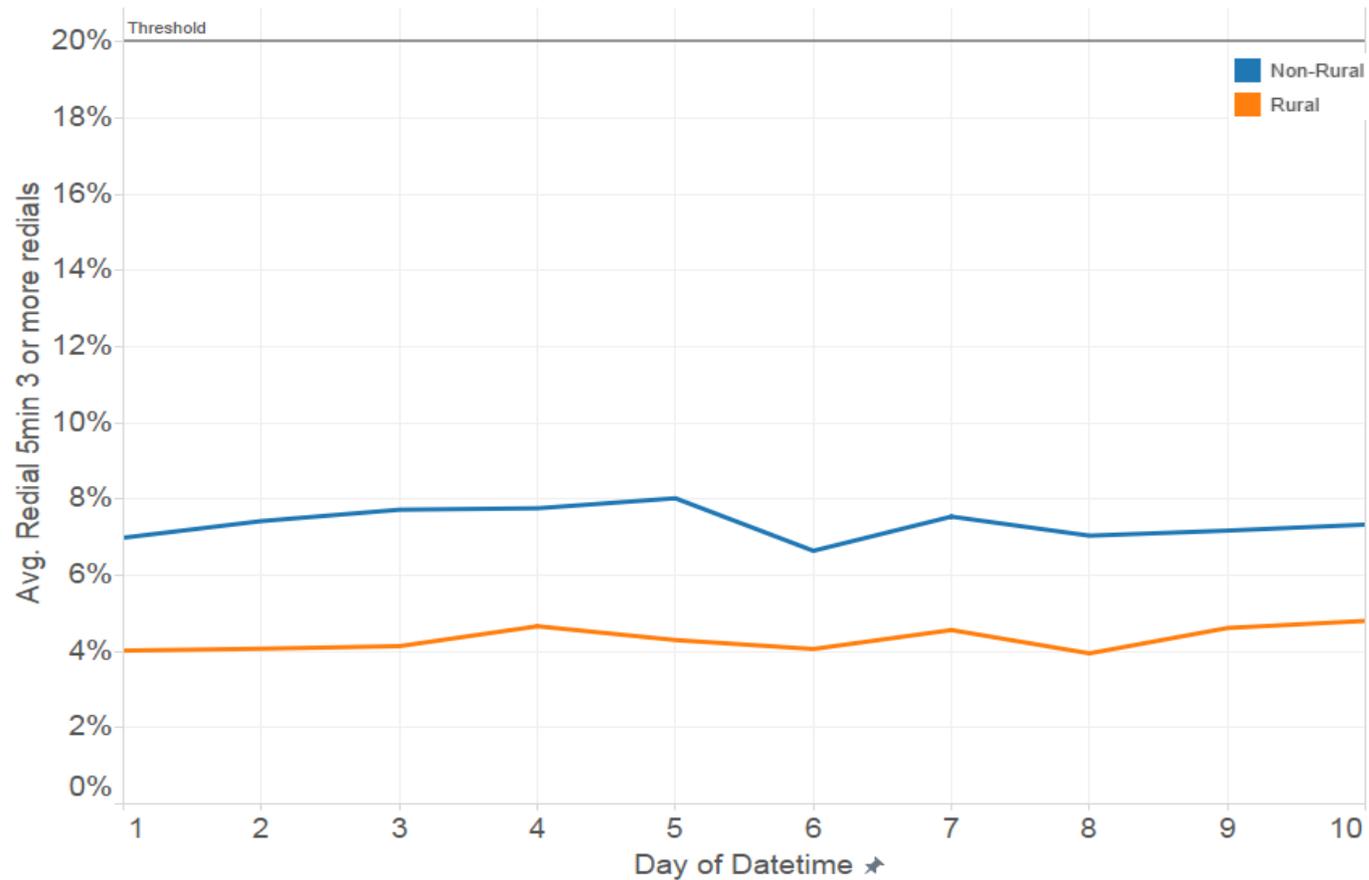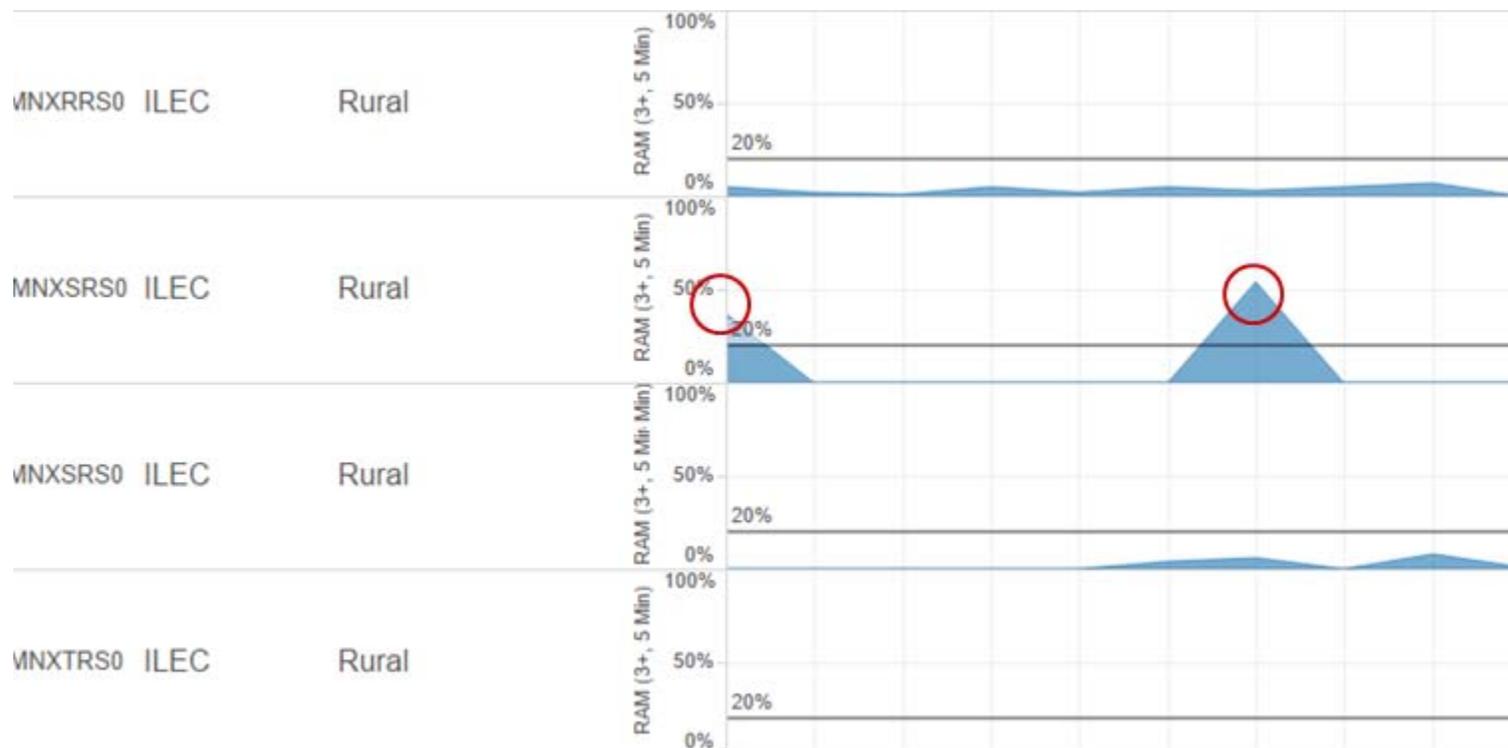
RAM Investigations

- In this sample, RAM generally runs in 5% to 10% range (December data).
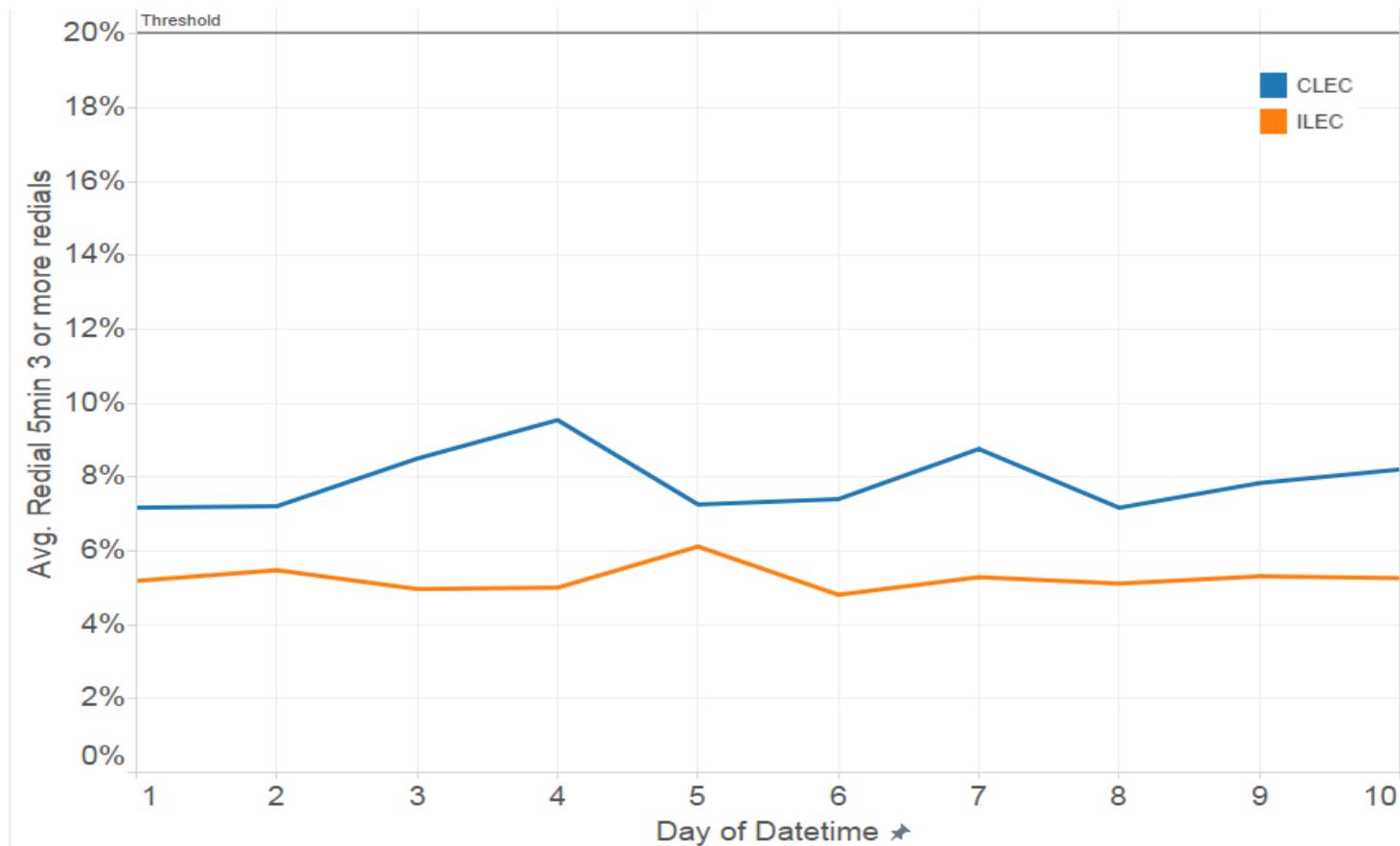
Rural Call Completion Industry Workshop – Panel Discussion

RAM Investigations

- **In this sample, RAM generally runs in 5% to 10% range (December data).**

Rural Call Completion Industry Workshop – Panel Discussion

RAM Investigations

- Currently focusing investigations on RAM spikes over 20% at the CLLI level.

Rural Call Completion Industry Workshop – Panel Discussion

RAM Investigations, Current Findings

- Too soon to draw conclusions on merits of RAM

- Data sample has not been statistically validated

- **Examples of findings**

  - Re-dials on user-busy

  - End office/customer outages/equipment issues

  - Single from/to combinations (e.g., fax machine retries)

  - Mass call events (radio station contests)

  - Auto-dialer retries (still some auto-dialer traffic in the sample)

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Rural Call Completion Industry Workshop – Panel Discussion

RAM Investigations: Potential Enhancements to Metric

- **Unassigned Numbers**: Exclude any CALLED number that received a RWC 1 in the most-recent data sample.

- **Autodialers**: Exclude any CALLING number for which 50% or more of its calls were to unassigned numbers.

- **Machine Retries**: Do not count re-attempts within 3 seconds.

- **Single from/to number combinations**: Filter out RAM spikes resulting from issues between a single pair.

- **RWC 17**: Filter out retries to RWC 17, User Busy

- **Timing**: Investigate based on deviation from trend, not objective spikes.

Trade off: Increased Complexity / Fewer False Positives

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Rural Call Completion Industry Workshop – Panel Discussion

Response to Complaints

- **Verizon receives complaints related to rural call completion through multiple channels.**

  - FCC (Consumer, wireline, and enforcement Bureaus)

  - RLEC hotline (dedicated toll-free number for carriers established in 2011)

  - Customers (voice customer complaints are automatically filtered for potential rural call completion issues)

    - Consumers (Wireless & Wireline)

    - Wholesale

    - Business

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Rural Call Completion Industry Workshop – Panel Discussion

Response to Complaints: RLEC hotline (dedicated toll-free number for carriers established in 2011)

- Verizon RLEC hotline: 800-285-3776

- Dedicated, toll-free number that rural local exchange carriers can use to contact Verizon for assistance in trouble-shooting and remediating call completion issues involving Verizon customers.

- More information at: http://www.verizon.com/about/rural-call-testing

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Rural Call Completion Industry Workshop – Panel Discussion

Complaint Investigations

- Timely, detailed complaints, with engagement from required parties can be useful in identifying and systemic call-failure drivers.

- Many issues are intermittent or transitory; resolve without intervention.

  - Inherent aspect of PSTN.

  - Acceptance of "no trouble found" as root cause.

  - Can lead to under-reporting.

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Results of Academic Research

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NTCA Presentation

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Rural Call Completion Industry Workshop

Open Discussion / Q&A

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Closing Remarks

Thank you.

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