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December 14, 2014

Nicholas A. Fraser, Desk Officer
The Office of Management and Budget
725 17th Street NW
Washington, DC 20503

Re: PRA Application FCC Rural Call Completion Order; OMB 3060-1186/FCC WC 13-39

Dear Mr Fraser:

The Voice Communication Exchange Committee (VCXC) submits the following comment **opposing** Paperwork Reduction Act (PRA) approval for data collection requirements in the Federal Communication Commission (FCC) Rural Call Completion (RCC) Order. The data collection purports to give the FCC a means to detect call completion problems regard reporting operators and the 1400 Operating Company Numbers (OCN's) designated as rural.

The RCC Order seeks reporting of telephone metadata from network operators in support of calculating a diagnostic metric the Commission found useful rural call completion investigations. The FCC seeks to track the gap between rural and non-rural call **answer rates** for all facilities based operators. The RCC Order does not explain the underlying rationale for the leap from the **call completion failures** motivating the Order to an investigation of call answer rates, but the Commission believes a gap between rural and non-rural **call answer rates** of more than 2% indicates call completion problems. The Order proposes to remove reporting obligations from companies demonstrating compliance with this 2% "gap" criteria Commission satisfaction.

The FCC reliance on call answer rate to detect call completion failure makes the project suspect without needing additional detail. There exist a range of non-network performance, non-call completion performance, and user driven factors effecting call answer rate. The merit of imposing a 2% call answer rate gap metric on the entire industry does not seem self evident, but the case for denying PRA approval does require weighing the merit of the gap metric. VCXC finds sufficient flaws in the data collection to conclude the FCC obtains no reliable basis to assess rural to non-rural call answer rate gaps, so the data collection plan fails without regard to the merits to the gap metric.

The problems arise from an erroneous conception of network operation, an insurmountable needle/haystack problem caused by the collect everything strategy (assume everyone guilty rather than following up on complaints), and an accumulation of uncertainty leaving the resulting summary reports a collection of random numbers.

Background

The FCC seeks PRA approval for a rule requiring covered facilities based network operators to collect and file telephone metadata on a quarterly basis. The FCC plans to use the resulting summary reports as input for a calculation of % calls answered. The FCC will provide a spreadsheet template to organize operator data (calls attempted, calls answered, busy, ring no answer, and unassigned number), by rural and non-rural OCN as well as separating interstate from intrastate.

The FCC imagines the resulting summary reports provide a means to “quickly and efficiently identify and pursue any problems” with call completion in rural areas. The FCC believes the benefits of the new reporting requirements include “..., aiding enforcement action in connection with providers' call completion practices as necessary” and “strengthen the Commission's ability to ensure a reasonable and nondiscriminatory level of service to rural areas.” The PRA application Supporting Statement includes under **Existing Information Collection Requirements**:

(g) The information obtained through this collection allows the Commission to become aware of unjust or unreasonable practices or discrimination in the provision of long distance telephone service in a timely manner. Without this data collection, the Commission would not be able to minimize any adverse effects on the public.

The FCC anticipates the review of reports from the estimated 90 covered providers requires an average of 30 minutes of government staff time per quarter.

The RCC Order data collection attempts to generalize, automate, and extend to the entire industry methods applied in the rural call completion investigations. The years long case by case enforcement investigations consume significant agency resources. The proposal for a new data collection addresses rural advocate concern the successes of the complaint by complaint methods do not scale sufficiently to resolve all rural call completion issues in a timely manner.

The **failure** of the data collection to achieve these objectives reflects flaws three areas:

- FCC plan relies on an erroneous conception of network operation
- FCC collect everything approach creates an insurmountable needle/haystack problem
- Accumulation of uncertainty leaves the summary reports a collection of random numbers

All three flaws provide independent and sufficiently compelling reasons to withhold PRA approval, because any one of the flaws render the summary report useless for the stated purpose. The comments below describe the flaws in detail and highlight additional deficiencies in the hope of improving future data collection proposals.

Still No Perpetual Motion Machines

Call completion failures hold the potential for significant consequences, but they do not announce themselves via “call completion failure” telephone metadata. The summary data resulting from the FCC data collection efforts does not contain information useful in identifying call completion problems. There exists no short cut for discovering call completion failures, because successful call completion involves the network elements of multiple operators across the entire telephone network.

Identifying failures in a system as complex as the telephone network requires real-time network

instrumentation and alerts as well as deep expertise and troubleshooting. This represents the daily project for multiple tens of thousands of network operations staff. The proposition the FCC can monitor the state of call completion across the entire telephone network through quarterly summary reports fails (should have failed) a sanity test.

The realities of network operation must remain central to any plan for addressing concerns about rural call completion. The strategy of comparing rural and non-rural calls answered fails to account for the myriad of factors irrelevant to the call completion performance of networks effecting call answer rates. The FCC offers no plan to separate the effects of the different factors. Tracking the rural/nonrural answer rate gap reflects an attempt to generalize a metric that proved useful in enforcement investigations (won penalties via negotiated consent decrees with Level 3, Matrix, and Windstream.)

The FCC does not succeed in generalizing the utility of metric, because the RCC Order data collection changes to purpose of the metric. The use of the rural and non-rural call answer rate comparison in the context of an enforcement investigation comes **after discovering** a problem and in the context of a conversation with a specific operator with the knowledge to resolve ambiguities. The gap metric need only provide evidence to confirm a problem discovered through a complaint. In the case of the RCC Order data collection, the FCC plans to use the gap metric **to discover** problems without relying on a complaint.

The Commission can narrow a data request by time period and network element in an enforcement investigation using knowledge provided by the operator. The RCC Order collect everything ask questions later strategy fatally lacks this advantage. The plan to extract meaning from data accumulating the over the period of a month lacks resolution. Month by month reporting addresses only steady state call completion issues and misses the possibility of events playing out in seconds, minutes, hours, days or weeks as the source of complaints.

Everyone Guilty, Collect Everything, Sort the Good Guys and Bad Guys Later

The Commission plans to monitor an the entire industry and avoid relying on complaints (probable cause) by requesting data from all operators. The Commission believes assuming everyone guilty holds the promise of speeding the resolution of rural call completion issues. VCXC finds the RCC data collection makes a false promise as well as delays and takes resources from more direct approaches. The data collection described in the RCC Order amounts to an attempt to enforce speed limits by requiring everyone with a driver license to report their driving habits on a quarterly basis.

Call completion failures can arise from a myriad of causes, but they remain rare events in the context of the nearly one trillion call attempts on an annual basis. There exist no way to avoid an extremely daunting “needle and haystack” problem. The utility of available telephone metadata does not extend beyond real-time monitoring, because telephone metadata addresses the question of call completion failures only indirectly. Identifying a call completion failure from metadata requires both a call status properly reflecting actual outcomes and specific knowledge about other issues (e.g. an overnight software update suggests starting the troubleshooting with a specific switching center.)

The challenge of separating call completion failures from the call completion successes becomes quickly insurmountable with calls accumulating by the millions each minute. The Commission appears to imagine detecting a single flaw in a population of 100 calls amounts to the same challenge as detecting 10 flaws in a population of 1000 calls. As noted, the “call completion failure” telephone metadata does not exist, so the detection problem requires context specific knowledge necessary to interpret the connection between reported call status and call completion problems. The number of

connections grows much faster than group size according a standard equation for the number of possible links (relationships) connecting “n” nodes (calls) in a network:

$$\text{Possible Relationships} = n(n-1)/2$$

The error rate underlying rural call completion issues may be constant, but the interpretation challenge moves quickly beyond reach as group size grows. Pursuing problems in the context of the smallest possible group size represents the only means to preserve feasibility. The loss of probable cause (complaint) as a trigger and means to focus an investigation, the lack of knowledge available and magnitude of knowledge required dooms the data collection to suffer resource depleting false positives or simply provides insufficient basis to reach any conclusion.

A paperwork reduction approval process should appropriately deny even a successful collect everything approach. The FCC has not provided an estimate for (does not know) the magnitude of the rural call completion problem, but even a worst case assumption regarding the magnitude of rural call completion problem still renders 99.9% of the project a wasted documentation of successful call completions. The presumption of guilt further creates an adversarial environment and reduces the prospect for cooperation necessary identifying the root cause and resolve rural call completion issues.

Uncertainty Leaves Resulting Reports a Collection of Random Numbers

The discussion in the RCC Order displays an alarming naïvete and problematic confidence in the ability of telephone metadata to capture state of the network precisely. The FCC plans to impose an expensive non-solution on the companies providing voice service to 300 million people. The Commission could not have consulted anyone (or failed to heed the advice) with experience operating a complex system in the real world. The inefficient and problematic approaches to the data collection and quarterly reports would not survive a basic review of proper experimental design. The accumulation of uncertainty leaves the summary reports with no information about individual call completion failures or trends.

The varying physical processes used to generate telephone metadata regarding call progress do not (cannot) capture a perfect representation of reality. The Commission must find a basis for estimating uncertainty and account for the propagation of error. A call completion failure may masquerade as any and all of the cause codes the FCC considers and many others. The FCC cannot know whether ISUP22 messages 16 and 31 placed in the “Answered” category get generated in error by a call completion failure responsible for an end user complaint.

As an external actor, the Commission must view the telephone network as a set of inputs and outputs from a “black box.” The prospect for success hinges on the precision of the information (aka uncertainty) available regarding these inputs and outputs. The first issue regarding uncertainty arises from the fact a key input “call attempts” originates with the communicating public beyond the reach of even the operators. The Commission includes “Call Attempts” among the data requested from operators, but the Commission cannot know the actual number of call attempts (only an estimate generated by the network and then organized and reported by the operator.)

The FCC cannot know whether or not ALL of the complaints responsible for motivating the data collection reflect conditions that prevent the recording of a call attempt. The call attempts estimate defines the size of the population under consideration, and all the error rate calculations include the call attempts number in the denominator. The Commission might want to detect missing data by

comparing call attempts (total input population) to the sum of calls with cause codes (output), but the uncertain knowledge about call attempts undermines this routine opportunity for quality control.

The search for call attempts across the entire telephone network amounts to an attempt at “catching all the fish in the sea”. It seems unreasonable to presume none get away in the context of networks with multiple thousands of switches dealing with hundreds of billions of calls. The commission must rely on operator reported “Call Attempts” as a proxy for call attempts with no prospect for auditing the resulting data. The sensitivity of results to the unreliable call attempts number makes the data collection useless without going any further.

The data collection projects seeks to characterize a physical system (the telephone network) by stimulating the system with inputs (call attempts) and interpreting the resulting output (telephone metadata). The FCC plans to discover the presence of call completion failures by comparing the call answer rates of rural and non-rural OCN's. According to the RCC Order, this “gap” analysis involves deriving the percent of calls answered for each rural OCN and in aggregate for non-rural OCN's from the operator summary reports as follows:

$$\% \text{ Calls Answered} = \frac{\# \text{ Calls Answered}}{(\# \text{ Calls Attempted} - \# \text{ Unassigned Number})} \times 100$$

$$\text{Call Answer Gap} = \% \text{ Calls Answered (non-rural in aggregate)} - \% \text{ Calls Answered (rural by OCN)}$$

The FCC fails to address the fact a significant proportion of the calls fall into an indeterminate category with no valid cause code at all. The indeterminate category will vary by time of day and across operators and can rise as high as 20% of call attempts. The RCC Order includes no advice to the respondents or explains FCC plans regarding calls with indeterminate cause codes. In the context of single investigation, single time period, and single OCN, the FCC might safely ignore indeterminate outcomes by assuming call attempts generate indeterminate outcomes at the same rate for all cause codes. The RCC Order data collection lacks the context knowledge necessary to ignore indeterminate cause codes.

There exists many more types cause codes than the FCC considers and a range of practices across the industry as a function of equipment types, protocol types, and business need likely to classify the same event as different cause codes. Even in a data collection not suffering indeterminate or erroneous cause codes, the collecting and reporting of data to the FCC and subsequent processing of the data generates errors. In summary, the factors contributing to the uncertainty making the % Calls Answered unreliable continues as an endless list. For illustration purposes, VCXC offers the following as a starting point:

- a – errors caused by uncertainty about the actual the number of end user call attempts
- i – calls with indeterminate cause code (> 0)
- e – erroneous cause codes and variations in operator cause code definitions (> 0)
- r – reporting bias arising from operators desire to win good actor status (> 0)
- p – errors inserted during the reporting and processing by operator and FCC (> 0)
- m – errors associated with missing calls (> 0)
- o – other errors (> 0)
- u – uncertainties/errors as expressed rates accumulate $30 u = a + i + e + r + p + m + o$

Picking an appropriate uncertainty estimate requires knowledge of context that does not exist in the

collect everything everywhere approach proposed in the RCC Order. The FCC's stated purpose of using the summary reports to initiate enforcement requires applying a conservative (high) estimate for uncertainty. The question of uncertainty in the context of the RCC Order does not involve much debate relative to the precision ambitions the FCC identifies as required.

Good Versus Bad Actors

The RCC Order does not directly state the Commission theory regarding the root cause of rural call completion problems. Complications from the overhaul of networks due to the IP transition represents a possibility, but the Commission does not seem to believe the problems arise from unintended technical glitches. The data collection reflects a plan to identify bad actors imposing rural call completion failures as a consequence of regulatory arbitrage. The regulatory arbitrage opportunity arises from the relatively high and regulated rates for completing calls to rural areas. The Commission does not dwell on the topic as the issue remains a work in progress in other proceedings, but the RCC Order offers hints recognizing rural call completion issues as the consequences of prior rule making exercises.

As a further complication among complications, the FCC anticipates the bad actors pursuing the problematic regulatory arbitrage are intermediary operators not covered by the reporting requirements. The Commission believes imposing a reporting requirements and holding “the provider that makes the initial long-distance call path choice” accountable will force the covered operators to identify and expose or avoid the bad actors.

The RCC Order includes a detailed definition for winning recognition as a good actor and shedding reporting requirements. Good Actors certify for each of the previous 12 months:

- call answer rate gap $\leq 2\%$ as an overall average across rural OCN's
- call answer rate gap $\leq 3\%$ for 95% of rural OCN's
- call answer rate gap $> 3\%$ for a rural OCN requires company follow-up/resolution

QED – Quod Erat Demonstrandum (which was to be demonstrated)

The figure showing a worksheet template for the Summary Report in the RCC Order includes placeholder data with three significant digits. This represents an appropriate precision for recognizing a 2% call answer rate gap as the distinction separating Good Actors and Bad Actors.

Three significant digits requires the data collection to obtain an uncertainty/error rate $< .001$ or a resolution sufficient to recognize differences of less than 1 in 1000.

VCXC believes the accumulated uncertainty and problematic design of the data collection leaves the FCC with **zero significant digits**.

One can imagine reports from some operators achieving a single significant digit, but the Commission will have no means to distinguish between these and the reports populated with entirely random numbers.

The question of whether the gap metric accomplishes the purpose of detecting call completion issues is moot, but VCXC finds the metric dubious beyond the narrow investigation context (a small number of call attempts) with the additional knowledge necessary to judge uncertainty and interpret results.

VCXC recommends the **denial** of Paperwork Reduction Act approval for the data collection requirements in the Federal Communication Commission Rural Call Completion Order.

Sincerely,

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