

2021 Urban Rate Survey – Rates for Fixed Voice Service

Introduction

Every year, the Wireline Competition Bureau (Bureau) surveys the rates for standalone telephone service charged by a representative sample of fixed voice providers to “help ensure that universal service support recipients offering fixed voice and broadband services do so at reasonably comparable rates to those in urban areas.”¹ This document shows how the reasonable comparability benchmark for fixed voice service was calculated based on the 2021 Urban Rate Survey.²

The 2021 Urban Rate Survey (URS) received 495 responses with monthly rates from 69 different providers offering fixed voice service in 494 different census tracts. To determine the reasonable comparability benchmark for voice service, the Bureau used all responses (both incumbent LEC and non-incumbent LEC), consistent with the methodology previously adopted by the Bureau.³ The reasonable comparability benchmark is \$54.75, two standard deviations above the urban average (including subscriber line charges (SLCs)) for all local flat-rate providers.

The URS sampling and estimation methodology used to produce national estimates of rates for fixed voice services remains the same as implemented last year.

Sample Design and Selection

As with past surveys, the sampling unit for the 2021 fixed voice survey is a (service provider, census tract) pair. The frame (source data from which we selected our sample) for the survey is the set of sampling units encompassing providers offering fixed voice service to residential customers in urban census tracts. The frame consists of 111,124 sampling units from 665 service providers and 54,784 census tracts. The data used to construct the frame come from the December 2019 Form 477 and incumbent LEC study area boundary data collections.

The frame was divided into two strata:

- Incumbent LEC– Sampling units in which the service provider was identified as an incumbent LEC in the urban census tract. This stratum consisted of 55,416 sampling units encompassing 423 service providers and 52,334 urban census tracts.⁴
- Non-Incumbent LEC – Sampling units in which the service provider was identified as a non-incumbent LEC in the urban census tract. This stratum consisted of 55,708 sampling units encompassing 265 service providers and 37,486 urban census tracts.

For each sampling unit, the number of potential subscribers⁵ was calculated as:

¹ *Connect America Fund*, WC Docket No. 10-90, Order, 28 FCC Rcd 4242 (WCB/WTB 2013).

² In April 2019, the Commission eliminated the rate floor requirement. See *Connect America Fund*, WC Docket No. 10-90, Report and Order, 34 FCC Rcd 2621 (2019).

³ See 2014 Urban Rate Survey Methodology available at https://apps.fcc.gov/edocs_public/attachmatch/DA-14-520A3.pdf.

⁴ We excluded census tracks without residential households.

⁵ The number of potential subscribers is the estimated number of potential customers to which the providers advertise their service.

Number of Potential Subscribers = Provider Presence Ratio x (Number of households in the sampling unit's census tract)

The Provider Presence Ratio for an incumbent LEC sampling unit was calculated as the incumbent LEC's fraction of residential subscribers in the census tract relative to the total number of residential subscribers for all incumbent LECs in the census tract. Thus, we assumed that the incumbent LEC offered service within the entire tract if no other incumbent LEC reported residential subscribers in the census tract.

The Provider Presence Ratio for a non-incumbent LEC sampling unit is more complicated because non-incumbent LEC providers are generally able to define their own service areas. We therefore needed a proxy for the portion of households in the census tract that a non-incumbent LEC provider covers (i.e., the Provider Presence Ratio). To do this, we used a regression model to estimate the proportion of the census tract's households to which a non-incumbent LEC provider offers voice service. Similar to the 2020 survey, the regression model for the 2021 survey was also developed based on FCC Form 477 data relating broadband provider presence to broadband provider subscription with state variations.⁶ The resulting equation was then used to create a Provider Presence Ratio equation. A Provider Presence Ratio was calculated for each non-incumbent LEC sampling unit using the following formula:

$$\text{Provider Presence Ratio} = \frac{1}{1+10^{-Y}}$$

where

$$Y = b_0 + b_1 * \text{Log}_{10}\left(\frac{X}{1-X}\right) + r_n * \text{state}_n$$

X = proportion (percentage) of residential subscribers subscribing to a given provider in a tract, which is calculated as number of residential subscribers for provider in the tract divided by number of households in the tract.

State = indicators of which state the residential subscribers are in.

The b_0 , b_1 , and r_n are model coefficients. The model coefficients are included in the Appendix.

A sample of 264 sampling units and a sample of 236 sampling units, from the incumbent LEC and non-incumbent LEC strata respectively, were selected randomly with unequal selection probability as a function of number of potential subscribers from a provider in a given tract. The sample size in each stratum was allocated proportionally to that of the total number of potential subscribers. The selection was performed using the "strata" procedure in the R sampling package weighted proportionately by the units' number of potential subscribers described earlier.

⁶ Linear regression was used to regress $\text{Log}_{10}\left(\frac{p}{1-p}\right)$ on $\text{Log}_{10}\left(\frac{s}{1-s}\right)$ where p is the fraction of housing units covered by the broadband provider in the census tract and s is the provider's broadband subscriber fraction of households in the tract. This assumes that the relationship of voice provider presence to voice subscribership is similar to that of broadband provider presence to broadband subscribership.

The following table summarizes the survey frame and the sample drawn from it:

| | Stratum | Units | Providers | Census Tracts | Number of Potential Subscribers |
|--------|-------------------|---------|-----------|---------------|---------------------------------|
| Frame | Overall | 111,124 | 665 | 54,784 | 163,887,354 |
| | Incumbent LEC | 55,416 | 423 | 52,334 | 86,440,101 |
| | Non-Incumbent LEC | 55,708 | 265 | 37,486 | 77,447,253 |
| Sample | Overall | 500 | 73 | 499 | 912,124 |
| | Incumbent LEC | 264 | 34 | 264 | 518,267 |
| | Non-Incumbent LEC | 236 | 41 | 236 | 393,857 |

Survey Response

The table below shows the number of responses, the number of different service providers, and the number of different census tracts within each stratum for survey responses requested, received, and received indicating service was provided.⁷

| Stratum | Survey Status | Responses | Service Providers | Census Tracts |
|-------------------|------------------|-----------|-------------------|---------------|
| Incumbent LEC | Requested | 264 | 34 | 264 |
| | Received | 264 | 34 | 264 |
| | Service Provided | 264 | 34 | 264 |
| Non-Incumbent LEC | Requested | 236 | 41 | 236 |
| | Received | 236 | 41 | 231 |
| | Service Provided | 231 | 37 | 231 |
| All | Requested | 500 | 73 | 499 |
| | Received | 496 | 70 | 495 |
| | Service Provided | 495 | 69 | 494 |

Each response stating that service was provided indicated whether each of the following service types was offered:

- Unlimited or Flat-Rate Local Service
- Unlimited All-Distance Service
- Measured or Messaged Local Voice Service

⁷ Responses that indicated residential service was provided but later found to be business only or bundled only are excluded from this count.

The table below provides the number of responses with rates for each service type in each stratum.

| Service Type | Incumbent LEC Stratum Rates | Non-Incumbent LEC Stratum Rates |
|------------------------------------------|-----------------------------|---------------------------------|
| Unlimited or Flat-Rate Local Service | 264 | 164 |
| Unlimited All-Distance Service | 202 | 185 |
| Measured or Messaged Local Voice Service | 239 | 4 |

Monthly Rates and Rate Spreads

The rate spread (the maximum rate less the minimum rate) is an additional component of the calculation of the standard deviation of monthly rates. For each (service provider, census tract) pair, separate monthly rates were calculated for each of the two service technologies (circuit and interconnected VoIP (iVoIP)). The following average monthly rates were calculated:

- Average RSC⁸ = (Minimum RSC + Maximum RSC)/2
- Average StSLC⁹ = (Minimum StSLC + Maximum StSLC)/2
- Average StUSF¹⁰ = (Minimum StUSF + Maximum StUSF)/2
- Average ManEAS¹¹ = (Minimum ManEAS + Maximum ManEAS)/2
- Average FSLC¹² = (Minimum FSLC + Maximum FSLC)/2

If the service provider indicated that multiple rates were not offered in the census tract, then the average monthly rates above were set equal to the minimum¹³ monthly rate provided in the response.

For the reasonable comparability benchmark (CB), the following average monthly rate was used if the service provider offered multiple rates in the census tract:

- Minimum Rate CB = Minimum Rate + Minimum FSLC¹⁴
- Maximum Rate CB = Maximum Rate + Maximum FSLC
- Average Rate CB = (Minimum Rate CB + Maximum Rate CB)/2
- Rate Spread CB = Maximum Rate CB - Minimum Rate CB

The following average monthly rate was used if the service provider did not offer multiple rates in the census tract:

⁸ Recurring Service Charge is abbreviated as RSC.

⁹ State Subscriber Line Charge is abbreviated as StSLC.

¹⁰ State USF is abbreviated as StUSF.

¹¹ Mandatory Extended Area Service is abbreviated as ManEAS.

¹² Federal Subscriber Line Charge is abbreviated as FSLC.

¹³ The term “minimum” is used here to indicate that the RSC, StSLC, StUSF, ManEAS, and FSLC values for single rates (as opposed to multiple rates) because such values are recorded in the survey data set as a “minimum” value.

¹⁴ Federal Subscriber Line Charge is abbreviated as FSLC.

- Average Rate CB = Minimum Rate + Minimum FSLC
- Rate Spread CB = 0

Weights

Weights are required to ensure the contributions of each response properly represent the offers that consumers possibly receive nationwide. Weights are also used to ensure that a service provider's rates do not exert extra influence on the estimate only because the provider offers service using two technologies instead of one.

The 2021 survey weight construction is consistent to the 2020 survey weight construction. Each rate was assigned a weight:

$$\text{Weight} = \text{Sampling Weight} \times \text{Nonresponse Weight} \times \text{Rate Weight} \times \text{Number of Potential Subscribers}$$

Sampling Weight is the inverse of the selection probability for each sample unit. The selection probability is determined by the total number of units in each stratum, the sample size in each stratum, and the units' number of potential subscribers described in the sample selection section earlier. Each sample is assigned a sampling weight to reflect its selection probability.

Nonresponse Weight is assigned to each stratum to compensate for unit nonresponse in each stratum. It is the total number of potential subscribers sampled over the total number of potential subscribers in the sampled census tracts of a given provider who has provided rate responses in each stratum.

Rate Weight is assigned to average the rates for iVoIP and circuit when both are employed by the service provider in a census tract for that service. A service provider that offers a service via iVoIP and circuit technologies is given a weight of ½ for its rates for each service. Otherwise, the rates have a weight of 1.

Number of Potential Subscribers is the estimated number of potential customers to whom the providers advertise their service.

The final weight is the product of Sampling Weight, Nonresponse Weight, Rate Weight, and the Number of Potential Subscribers from a provider in a given tract.

Rate Estimates for Unlimited or Flat-Rate Local Service

The average rate is estimated as the following:

$$\text{Estimated average rate} = \frac{\sum_{i=1}^N w_i \text{Rate}_i}{\sum_{i=1}^N w_i}, \text{ N} = \text{total number of rate responses}$$

Estimates of the average rate and the standard deviation of rates were calculated separately for each stratum and for the strata combined. The estimated average rate was the weighted average of rates for the stratum or combined strata. The estimated standard deviation of rates is calculated as follows:

$$\text{Estimated standard deviation} = \sqrt{\frac{\sum_{i=1}^N w_i (\text{Rate}_i - \text{Estimated average rate})^2}{\sum_{i=1}^N w_i - 1}}$$

The table below presents the rate estimates for each stratum separately and combined.

| Service Providers | Without FSLC | | With FSLC | |
|-------------------|--------------|--------------------|-----------|--------------------|
| | Average | Standard Deviation | Average | Standard Deviation |
| Incumbent LEC | \$28.3276 | \$8.8368 | \$33.7172 | \$7.5886 |
| Non-Incumbent LEC | \$28.8152 | \$13.1458 | \$33.7477 | \$13.9958 |
| All | \$28.5148 | \$10.6901 | \$33.7289 | \$10.5091 |

Reasonable Comparability Benchmark

The reasonable comparability benchmark was calculated by taking two standard deviations above the average urban rate for all local flat-rate providers, with SLCs included in the rates.

| Service Type | Responses with Rates | Service Providers | Census Tracts | Average Rate | Two Std Devs above the Average Rate |
|--------------------------------------|----------------------|-------------------|---------------|--------------|-------------------------------------|
| Unlimited or Flat-Rate Local Service | 428 | 61 | 427 | \$33.73 | \$54.75 |

The reasonable comparability benchmark for voice service is based on the average monthly rate plus two standard deviations (including FSLC) for unlimited or flat-rate local service offered by incumbent LECs and non-incumbent LECs.¹⁵ This value is \$54.75.

¹⁵ See *Connect America Fund et al.*, WC Docket No. 10-90 et al., Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663, 17694, para. 84 (2011), aff'd sub nom *In re FCC 11-161*, 753 F.3d 1015 (10th Cir. 2014).

APPENDIX A

Provider Presence Ratio Model Coefficients

| | | Estimate | Std. Error |
|-----|-------------|----------|------------|
| b0 | (Intercept) | 2.329 | 0.037 |
| b1 | logpsubp1p | 0.663 | 0.003 |
| r1 | StFips02 | 1.316 | 0.111 |
| r2 | StFips04 | 0.684 | 0.045 |
| r3 | StFips05 | -0.206 | 0.063 |
| r4 | StFips06 | 0.757 | 0.038 |
| r5 | StFips08 | 0.466 | 0.047 |
| r6 | StFips09 | 0.947 | 0.053 |
| r7 | StFips10 | 0.093 | 0.084 |
| r8 | StFips11 | 0.895 | 0.076 |
| r9 | StFips12 | 0.370 | 0.040 |
| r10 | StFips13 | 0.010 | 0.045 |
| r11 | StFips15 | 0.808 | 0.076 |
| r12 | StFips16 | 0.532 | 0.073 |
| r13 | StFips17 | 0.601 | 0.041 |
| r14 | StFips18 | 0.335 | 0.046 |
| r15 | StFips19 | 0.411 | 0.056 |
| r16 | StFips20 | 0.613 | 0.055 |
| r17 | StFips21 | 1.002 | 0.056 |
| r18 | StFips22 | -0.015 | 0.050 |
| r19 | StFips23 | 0.082 | 0.073 |
| r20 | StFips24 | 0.171 | 0.047 |
| r21 | StFips25 | 0.699 | 0.045 |
| r22 | StFips26 | 0.513 | 0.042 |
| r23 | StFips27 | 0.379 | 0.049 |
| r24 | StFips28 | 0.100 | 0.076 |
| r25 | StFips29 | 0.753 | 0.047 |
| r26 | StFips30 | -0.326 | 0.109 |
| r27 | StFips31 | 0.935 | 0.062 |
| r28 | StFips32 | 0.265 | 0.052 |
| r29 | StFips33 | 0.297 | 0.092 |
| r30 | StFips34 | 0.612 | 0.044 |
| r31 | StFips35 | 0.473 | 0.066 |
| r32 | StFips36 | 1.228 | 0.040 |
| r33 | StFips37 | 0.456 | 0.044 |
| r34 | StFips38 | -0.206 | 0.105 |
| r35 | StFips39 | 0.851 | 0.042 |

| | | | |
|-----|----------|--------|-------|
| r36 | StFips40 | 0.488 | 0.052 |
| r37 | StFips41 | 0.355 | 0.052 |
| r38 | StFips42 | 0.411 | 0.041 |
| r39 | StFips44 | 0.640 | 0.082 |
| r40 | StFips45 | -0.089 | 0.051 |
| r41 | StFips46 | 0.281 | 0.109 |
| r42 | StFips47 | 0.236 | 0.047 |
| r43 | StFips48 | 0.441 | 0.039 |
| r44 | StFips49 | 0.473 | 0.050 |
| r45 | StFips50 | 1.099 | 0.149 |
| r46 | StFips51 | 0.308 | 0.045 |
| r47 | StFips53 | 0.608 | 0.046 |
| r48 | StFips54 | 0.112 | 0.069 |
| r49 | StFips55 | 0.768 | 0.047 |
| r50 | StFips56 | 0.796 | 0.128 |
| r51 | StFips72 | 1.265 | 0.050 |