2020 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 2020 Urban Rate Survey. [2]

The 2020 Urban Rate Survey (URS) received 488 responses with monthly rates from 65 different providers offering fixed voice service in 488 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 $54.76, 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 2020 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 116,446 sampling units from 692 service providers and 55,232 census tracts. The data used to construct the frame come from the December 2018 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 55,739 sampling units encompassing 440 service providers and 52,779 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 60,707 sampling units encompassing 276 service providers and 39,150 urban census tracts.

[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.

For each sampling unit, the number of potential subscribers[5] was calculated as:

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 2019 survey, the regression model for the 2020 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 268 sampling units and a sample of 232 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.

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

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

[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.

	Stratum	Units	Providers	Census Tracts	Number of Potential Subscribers
Frame	Overall	116,446	692	55,232	162,144,885
	Incumbent LEC	55,739	440	52,779	86,977,160
	Non-Incumbent LEC	60,707	276	39,150	75,167,725
Sample	Overall	500	76	500	865,453
	Incumbent LEC	268	34	268	512,248
	Non-Incumbent LEC	232	43	232	353,206

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	268	34	268
	Received	268	34	268
	Service Provided	268	34	268
Non-Incumbent LEC	Requested	232	43	232
	Received	223	35	223
	Service Provided	220	32	220
All	Requested	500	76	500
	Received	492	69	492
	Service Provided	488	65	488

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

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	258	160

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

Unlimited All-Distance Service	205	172
Measured or Messaged Local Voice Service	246	26

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 RSC[8] = (Minimum RSC + Maximum RSC)/2
- Average StSLC[9] = (Minimum StSLC + Maximum StSLC)/2
- Average StUSF[10] = (Minimum StUSF + Maximum StUSF)/2
- Average ManEAS[11] = (Minimum ManEAS + Maximum ManEAS)/2
- Average FSLC[12] = (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 minimum[13] 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 FSLC[14]
- 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:

- 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

[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.

not exert extra influence on the estimate only because the provider offers service using two technologies instead of one.

The 2020 survey weight construction is consistent to the 2019 survey weight construction. Each rate was assigned a weight:

Weight = Sampling Weight x Nonresponse Weight x Rate Weight x 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:

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

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:

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

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	$28.1684	$9.5887	$33.6112	$8.2925
Non-Incumbent LEC	$32.3396	$10.4474	$36.7485	$11.9904
All	$29.7617	$10.1217	$34.8095	$9.9772

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	418	55	418	$34.81	$54.76

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 $54.76.

[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)	2.417	0.036
b1	$\text{Log}_{10}(\frac{X}{1-X})$	0.765	0.003
r1	State Fips 02	1.348	0.109
r2	State Fips 04	0.359	0.044
r3	State Fips 05	-0.176	0.062
r4	State Fips 06	0.711	0.037
r5	State Fips 08	0.501	0.046
r6	State Fips 09	1.114	0.052
r7	State Fips 10	0.018	0.082
r8	State Fips 11	0.844	0.076
r9	State Fips 12	0.398	0.039
r10	State Fips 13	-0.018	0.044
r11	State Fips 15	0.629	0.074
r12	State Fips 16	0.383	0.069
r13	State Fips 17	0.522	0.040
r14	State Fips 18	0.336	0.045
r15	State Fips 19	-0.023	0.055
r16	State Fips 20	0.613	0.054
r17	State Fips 21	0.919	0.055
r18	State Fips 22	0.010	0.049
r19	State Fips 23	-0.069	0.076
r20	State Fips 24	0.081	0.046
r21	State Fips 25	0.648	0.045
r22	State Fips 26	0.529	0.041
r23	State Fips 27	0.384	0.048
r24	State Fips 28	0.069	0.074
r25	State Fips 29	0.699	0.047
r26	State Fips 30	0.123	0.093
r27	State Fips 31	0.652	0.064
r28	State Fips 32	0.270	0.051
r29	State Fips 33	0.079	0.090
r30	State Fips 34	0.793	0.043
r31	State Fips 35	0.519	0.062
r32	State Fips 36	1.340	0.039
r33	State Fips 37	0.302	0.044
r34	State Fips 38	-0.234	0.108
r35	State Fips 39	0.834	0.041

r36	State Fips 40	0.153	0.052
r37	State Fips 41	0.331	0.052
r38	State Fips 42	0.379	0.041
r39	State Fips 44	0.581	0.080
r40	State Fips 45	-0.093	0.050
r41	State Fips 46	-0.003	0.101
r42	State Fips 47	0.155	0.047
r43	State Fips 48	0.494	0.038
r44	State Fips 49	0.473	0.049
r45	State Fips 50	1.174	0.147
r46	State Fips 51	0.224	0.045
r47	State Fips 53	0.567	0.045
r48	State Fips 54	0.158	0.070
r49	State Fips 55	0.599	0.047
r50	State Fips 56	0.192	0.125
r51	State Fips 72	0.857	0.053