# 2023 Urban Rate Survey – Fixed Voice Service

## Introduction

Every year, the Wireline Competition Bureau (Bureau) and the Office of Economics and Analytics (OEA) (together, Bureau/OEA) conduct the fixed voice Urban Rate Survey (voice URS) to collect data on rates for standalone telephone service charged by a representative sample of fixed voice providers in urban census tracts[1] in the United States.

The main purpose of the voice URS is to produce a national benchmark, called the "reasonable voice comparability benchmark." This benchmark serves as a rate cap 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."[2]

Consistent with the methodology adopted,[3] the Bureau/OEA continued to calculate the reasonable voice comparability benchmark this year by estimating the national average local flat rate, including subscriber line charges (SLCs), and adding to it twice the estimate of its standard deviation.

For 2023, the reasonable comparability benchmark for fixed voice service is **$59.62**.

This document describes in detail how this benchmark was calculated based on data from the 2023 voice URS.

## Sample Design

### *Primary sampling unit and sampling frame*

The 2023 voice URS retains the same definition of primary sampling unit (PSU, or "sampling unit") as used in past survey cycles. That is, a PSU is a pair consisting of a voice service provider and an urban census tract where the provider offers at least one fixed voice service to residential customers therein. In rare cases where this pair is distinguishable based on the provider's designation as both an incumbent local exchange carrier (ILEC) and a non-ILEC in the census tract, the PSU definition accommodates this distinction.

As in previous years, the Bureau/OEA developed the sampling frame for the 2023 voice URS based on data from the FCC Form 477, as of December of the year prior to data collection, together with information from the ILEC study area boundary data collections.[4] The 2023 voice URS frame consists of 80,903 sampling units from 329 service providers and 51,375 census tracts.

---

[1] Prior to this year's URS, urban census tracts were defined as tracts with at least one populated block located within an urban area or urban cluster that is also located within a county designated as a metropolitan statistical area. Because the Census Bureau has updated the definition of urban areas using the results of the 2020 Census, the Bureau/OEA had to adopt a new definition of urban tracts: a 2020 tract is urban if at least 80 percent of its housing units are within a 2010 tract Urban Area that has a population of at least 50,000.

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

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

[4] We excluded census tracts without residential households.

***Stratification***
The voice URS uses a stratified sample design. Stratification is the division of a heterogenous population (represented by the sampling frame), into subpopulations called strata (singular: stratum), each of which is internally homogenous with respect to the population characteristic(s) of interest. When properly implemented, this commonly used sample design element can produce gains in precision in the estimates of characteristics of the whole population.[5]

Prior to the 2022 voice URS, the Bureau/OEA stratified the voice URS sampling frame based on the provider's status as either ILEC or non-ILEC. This stratification, however, disproportionately resulted in regular increases in the number of sampling units selected for the country's major provider of voice service in urban areas, namely AT&T. Because historical data suggest that there is little variation in the rates charged by AT&T, selecting more samples from this provider, and therefore selecting fewer from other providers, does little to achieve the goal of stratification.

For this reason, the Bureau/OEA carved out two separate strata for AT&T in the 2022 voice URS, one for ILEC and the other for non-ILEC AT&T providers. This year, after staff found no significant improvement in sample efficiency by separating AT&T providers into ILEC and non-ILEC, these two AT&T strata were collapsed into one. Thus, the 2023 voice URS has three strata:

- AT&T;
- Non-AT&T and ILEC; and
- Non-AT&T and Non-ILEC.

***Sample Allocation***
Consistent with sampling procedures used in prior voice URS cycles, the Bureau/OEA applied proportional allocation[6] to determine how many sampling units to select from each stratum. Based on Bureau/OEA staff analysis of historical data, 80 of the fixed sample size of 500 sampling units for the voice URS were apportioned to the AT&T stratum, while the rest were apportioned to the non-AT&T strata. These sample counts were then allocated to the respective ILEC and non-ILEC strata in proportion to the number of sampling units in the stratum.

The table below includes information on the sample allocation for the 2023 voice URS.

***Measure of Size and Sample Selection***
The voice URS implements probability sampling, which means that every sampling unit has *some* chance of being selected in the sample, but not equal probability sampling, where every sampling unit has an *equal* chance of selection. Instead, the voice URS sample design calculates a measure of size (MOS) for every sampling unit in the frame, and selects the sample independently within each stratum based on this MOS. Thus, for example, if sampling unit A has a MOS that is twice that of sampling unit B, then A is twice as likely to be selected in the sample compared to B. This type of unequal probability selection is called probability proportional to size (PPS) sampling.[7]

[5] William G. Cochran, Sampling Techniques ch. 5 (3rd ed. 1977).

[6] *Id*. at 91.

[7] *Id*. at 251.

As in prior years, the Bureau/OEA calculated the MOS for the 2023 voice URS sampling units (which, as described above, are pairs of provider-census tract) by estimating the provider's number of potential subscribers in the census tract.

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

The Provider Presence Ratio for an ILEC sampling unit was calculated as the fraction of residential provider's subscribers in the census tract relative to the total number of residential subscribers for all providers in the census tract. This ratio is 1 if the provider has a monopoly in the census tract.

The Provider Presence Ratio for a non-ILEC sampling unit is more complicated because non-ILEC 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-ILEC 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-ILEC provider offers voice service. Like the 2021 survey, the regression model for the 2023 voice URS was also developed based on FCC Form 477 data relating broadband provider presence to broadband provider subscription with state variations.[8] The resulting equation was then used to create a Provider Presence Ratio equation. A Provider Presence Ratio was calculated for each Non-ILEC 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.

In either case, the number of potential subscribers may not exceed the number of households in the sampling unit's census tract.

After completing the stratification, sample allocation, and measure of size calculation steps, the Bureau/OEA selected the final sample using SAS proc surveyselect with PPS selection option.[9] The procedure selected a total of 500 sampling units.

The first table on the next page summarizes the sample design for the 2023 voice URS.

---

[8] 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.

[9] The SURVEYSELECT Procedure, SAS User's Guide, https://documentation.sas.com/doc/en/pgmsascdc/9.4_3.3/statug/statug_surveyselect_toc.htm.

| | Stratum | Units | Providers | Census Tracts | Number of Potential Subscribers |
|---|---|---|---|---|---|
| **Frame** | Overall | 80,903 | 329 | 51,375 | 131,342,958 |
| | AT&T | 27,593 | 9 | 27,337 | 45,362,541 |
| | Non-AT&T & ILEC | 22,499 | 148 | 22,125 | 37,967,580 |
| | Non-AT&T & Non-ILEC | 30,811 | 181 | 25,327 | 48,012,837 |
| **Sample** | Overall | 500 | 82 | 499 | 927,562 |
| | AT&T | 80 | 8 | 80 | 153,870 |
| | Non-AT&T & ILEC | 185 | 26 | 185 | 369,355 |
| | Non-AT&T & Non-ILEC | 235 | 49 | 235 | 404,337 |

**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.[10]

| Stratum | Survey Status | Responses | Service Providers | Census Tracts |
|---|---|---|---|---|
| AT&T | Requested | 80 | 8 | 80 |
| | Received | 80 | 8 | 80 |
| | Service Provided | 80 | 8 | 80 |
| Non-AT&T & ILEC | Requested | 185 | 26 | 185 |
| | Received | 184 | 25 | 184 |
| | Service Provided | 182 | 24 | 182 |
| Non-AT&T & Non-ILEC | Requested | 235 | 49 | 235 |
| | Received | 223 | 46 | 223 |
| | Service Provided | 185 | 40 | 185 |
| All | Requested | 500 | 82 | 499 |
| | Received | 487 | 78 | 486 |
| | Service Provided | 447 | 71 | 446 |

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

[10] 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 | AT&T | Non-AT&T & ILEC | Non-AT&T & Non-ILEC |
|---|---|---|---|
| Unlimited or Flat-Rate Local Service | 80 | 196 | 139 |
| Unlimited All-Distance Service | 86 | 111 | 118 |
| Measured or Messaged Local Voice Service | 22 | 115 | 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 RSC[11] = (Minimum RSC + Maximum RSC)/2
- Average StSLC[12] = (Minimum StSLC + Maximum StSLC)/2
- Average StUSF[13] = (Minimum StUSF + Maximum StUSF)/2
- Average ManEAS[14] = (Minimum ManEAS + Maximum ManEAS)/2
- Average FSLC[15] = (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[16] 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
- 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

[11] RSC is Recurring Service Charge.

[12] StSLC is State Subscriber Line Charge.

[13] StUSF is State Universal Service Fund .

[14] ManEAS is Mandatory Extended Area Service.

[15] FSLC is Federal Subscriber Line Charge.

[16] The term "minimum" is used for consistency with the naming convention in the survey data. For census tracts where the service provider indicated that multiple rates were not offered (i.e., only a single rate was submitted), the rates are recorded in the survey dataset as the "minimum" value.

**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 2023 voice URS weight calculation method is the same as what had been used in past survey cycles. Each rate was assigned a weight according to the following equation:

*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:

$$\text{Estimated average rate} = \frac{\sum_{i=1}^{N} w_i \times Rate_i}{\sum_{i=1}^{N} w_i},$$

where $N$ = total number of rate responses and $w_i$ is the final weight as just described.

Estimates of the average rate and the standard deviation of rates were calculated separately for each stratum and overall.

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 |
| AT&T | $41.01 | $6.03 | $47.03 | $6.20 |
| ILEC | $24.08 | $4.46 | $30.23 | $4.45 |
| Non-ILEC | $27.56 | $12.85 | $29.94 | $12.53 |
| All | $31.61 | $11.07 | $36.73 | $11.44 |

**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 | 427 | 58 | 389 | $36.73 | $59.62 |

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.[17] This value is $59.62.

[17] *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).