NATIONAL EXCHANGE CARRIER ASSOCIATION, INC.

ACCESS SERVICE
TARIFF F.C.C. No. 5

TRANSMITTAL NO. 1694
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VOLUME 1:   DESCRIPTION AND JUSTIFICATION

Defines the purpose of the filing, describes the rate structure of the access services and
summarizes results.

VOLUME 1-2:   TARIFF REVIEW PLAN

VOLUME 2:   DEVELOPMENT OF ACCESS ELEMENT REVENUE
                        REQUIREMENTS

Provides a projection of the companies' interstate investments, expenses, revenues and taxes
for the past year cost of service study and test year.

VOLUME 3:   DEVELOPMENT OF BASELINE DEMAND AND REVENUES

Provides the development of the demand quantities and revenues for the test year at current
rates.

VOLUME 4:   COMMON LINE RATE DEVELOPMENT

Describes and documents the procedures used to develop Common Line Rates, Federal
Universal Service Charges, and Consumer Broadband-only Loop rates.

VOLUME 5:   TRAFFIC SENSITIVE RATE DEVELOPMENT

Describes and documents the procedures to develop recurring and non-recurring rate
levels for Switched Access and Special Access services. It also describes the procedures
used to develop miscellaneous charges for additional engineering, maintenance and
testing of these services, as well as describing the development of Eligible Recovery,
ARC rates, and CAF ICC support estimates.

Volume 3

DEVELOPMENT OF BASELINE DEMAND AND REVENUES

TABLE OF CONTENTS

Volume 3

DEVELOPMENT OF BASELINE DEMAND AND REVENUES

Section 1

INTRODUCTION

A.   OVERVIEW

This Volume describes the development of the demand forecasts for the access lines,

Consumer Broadband-only Loops (CBOLs), Traffic Sensitive Switched Access and Traffic

Sensitive Special Access categories. Section 2 describes the development of access line forecasts

by service category based on historical and forecasted access line counts together with service

category shares received from Common Line pool participants. It also describes the source of

data for CBOL forecasts. Section 3 describes the development of interstate local switching

minutes of use (LS MOU) forecasts which are used to pre-populate the interstate MOU in the

Connect America Fund Intercarrier Compensation (CAF ICC) data collection[1] NECA conducted

in April. It also describes the CAF ICC Data Collection for fiscal year 2022[2] historical data and

2023/2024 test period projections of intrastate and interstate switched access demand from

NECA's Traffic Sensitive pool members. Using the collected data, NECA developed each

carrier's Access Recovery Charge (ARC) at the exchange/rate zone level and CAF ICC at the

study area level. Section 4 describes the methods NECA used to develop aggregated and

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[1] To implement the *USF/ICC Transformation Order* issued in November 2011, NECA designed a web system to collect information needed to develop the rate elements and support amounts in the order. Appendix B 2023 CAF ICC Data Collection details the design and the variables of NECA's web system. *See Connect America Fund*, WC Docket No. 10-90 et al., Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663 (2011). NECA members have the ability to override NECA's forecasts.

[2] Fiscal year 2022 is a time period from October 1, 2021 to September 30, 2022, as defined in the *USF/ICC Transformation Order*.

disaggregated forecasts for Special Access revenues. Special access demand at the rate element level was derived from the aggregate special access forecast using data from NECA's Advanced Services Demand Data Request,[3] in which NECA collected demand for major rate elements for Ethernet special access services from its TS pool member companies, and CABS billing data. Using the same datasets, NECA developed the revenue projections for banded and unbanded Special Access services.

B.   ACCESS LINES DEMAND FORECAST METHODOLOGY

NECA used Unobserved Component Models (UCM)[4] to develop access line forecasts for all study areas in the CL pool. NECA's line forecasts were then used to interpolate the forecasts between the months of December 2022, December 2023, and December 2024 which member companies submitted in the annual Forecast Line Count Data Collection in February 2023. Section 2.A describes the details of this methodology.

In its annual Forecast Line Count Data Collection,[5] NECA collected both historical and forecasted access line counts by service category from individual exchange carriers.

1.   NECA asked its member companies to provide historical data as of December 31, 2022 and forecasts as of December 31, 2023 and December 31, 2024.

2.   To assist member companies in developing their line count forecasts, NECA provided them with study area specific service category level "guidance

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[3] Refer to Appendix C 2023 Advanced Services Demand Data Request for details.

[4] *See* Harvey, A. C. 1989. *"Forecasting, Structural Time Series Models and the Kalman Filter"*, Cambridge: Cambridge University Press.

[5] Refer to Appendix A 2023 Forecast Line Count Data Collection for details.

forecasts" as a reference before opening its Forecast Line Count Data Collection website in January.

3.   NECA used the data collected from member companies to calibrate NECA's study area line count forecasts and develop test period End User revenues for the Form 508 filing filed on March 31, 2023 with USAC. Companies had the option to override these projections with their own projections for the purposes of the Form 508 filing and this filing.

4.   NECA used the calibrated forecasts to pre-populate access line forecasts for the CAF ICC Data Collection, where available. Companies had the flexibility to either keep NECA's forecasts or override them with their own forecasts for purposes of this filing.

C.   CBOL DEMAND FORECAST METHODOLOGY

Companies reported projected broadband-only loop demand to NECA in support of the estimation of projected CAF BLS amounts. Volume 1, Appendix D contains carrier certifications attesting to the accuracy of the carriers' CAF BLS data. These certifications were obtained via the Form 508 certification filed on March 31, 2023 with USAC; or for companies with updated consumer broadband-only loops after that filing with USAC, with new certifications attesting to the accuracy of a carrier's underlying data submitted with this filing. The broadband-only loop counts were used to develop CBOL rates as described in Volume 4 of this filing.

D.	SWITCHED ACCESS AND SPECIAL ACCESS DEMAND FORECASTING

METHODOLOGY

NECA applied a standardized four-step approach to forecast both Interstate Switched

Access and Special Access demand.

1.	All data were adjusted to reflect July 1, 2023 tariff participation changes[6] and

were trued-up, if necessary, to anticipated final levels using factors calculated

from historical pool updates.[7]

2.	Study areas not affected by acquisitions of exchanges and, in the case of special

access DSL, that did not detariff DSL were identified to construct homogeneous

data groups used to model and forecast aggregate demand growth.

3.	A time-series model of Autoregressive Integrated Moving Average (ARIMA) was

selected based on statistical criteria to forecast demand at the aggregate pool

level.[8]

4.	A time-series model of UCM was estimated for each study area to develop each

study area's share in the group. It was then used to develop test period company-

level forecasts and billing data were used to develop access service rate element

forecasts for the pool.

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[6] *See* Vol. 1, section 1.A and Vol.1, Exhibit 1 for a display of tariff participation changes.

[7] NECA's pooling procedures, which have been in effect since the inception of access charges, permit a period of up to twenty-four months after the data month for the companies to report "trued-up" interstate revenues and demand to the CL and TS Pools.

[8] *See* Hamilton, J. D. 1994. "Time Series Analysis", Princeton University Press, Princeton, NJ.

All interstate forecasts were adjusted to include demand levels relating to study areas affected by acquisitions of exchanges. The study area's interstate MOU forecasts were used to pre-populate the interstate MOU section of the CAF ICC Data Collection system and companies had the ability to modify the projections rather than use NECA's projection in their final data submission.

NECA relied on individual study areas to develop their own intrastate switched MOU forecasts. NECA collected its members' fiscal year 2022 historical data and 2023/2024 test period forecasts of interstate switched minutes and intrastate terminating switched minutes in April as part of NECA's CAF ICC Data Collection. The details are described in Section 3.B.

Study areas' interstate special access forecasts were used to develop proposed rates displayed in Volume 5.

E.   FORECAST RESULTS

Using the methodology described above and data collected as part of the CAF ICC Data Collection, NECA's test period demand growth forecasts are as follows:

Access Lines Forecast

(Common Line Pool)

Residential CPT Growth	Single-Line Business CPT Growth	Multi-Line Business CPT Growth	Total Access Lines Growth	Consumer Broadband-only Loops	Total Lines Growth
-7.6%	-6.0%	-5.8%	-7.2%	12.9%	0.7%

MOU Forecast

(Switched Portion of Traffic Sensitive Pool)

Interstate MOU Growth	Intrastate MOU Growth[9]
-14.1%	-7.7%

Special Access Revenue ($, constant rate) Forecast

(Traffic Sensitive Pool)

DSL Revenue Growth	Non-DSL Non-ETS Revenue Growth	Non-DSL ETS Revenue Growth	Special Access Revenue Growth (DSL & Non-DSL)
-6.2%	-15.0%	11.0%	-7.6%

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[9] For the companies that did not provide their FY 2022 intrastate MOU, the data from the March 2023 settlement view was used in the calculation.

Volume 3

DEVELOPMENT OF BASELINE DEMAND AND REVENUE

Section 2

ACCESS LINES DEMAND FORECASTS BY SERVICE CATEGORY

A.   <u>NECA'S STUDY AREA LINE FORECASTS</u>

NECA used a UCM model to develop the forecasts for each study area participating in NECA's Common Line pool that reported common line data since at least January 2019 for the 2023/2024 test period.

Forecasts were developed separately for a consistent set of companies that have participated in NECA's Common Line pool and for companies that have recently joined the Common Line pool. The consistent set of companies includes companies meeting the following four criteria:

1.   They were in the NECA Common Line pool throughout the period from January 2003 to December 2022 and reported their lines to NECA.

2.   They elected to remain in the Common Line pool for the 2023/2024 test period.

3.   They neither bought nor sold exchanges during the period from January 2003 through December 2022.

4.   They did not experience any major decline in demand due to the loss of major customers.

For this set of companies (about 99 percent of the access lines reported to the pool), study area level forecasts were developed using a unique UCM model for every study area.[10]

For the companies not in the consistent sample, their forecasts were developed using a UCM model for each study area, accounting for different start periods of NECA pool membership and shifts in access line counts. For each study area monthly forecasted line counts for the period from July 2023 through June 2024 were averaged to arrive at NECA's test period access line forecasts. The test period line count for all Common Line pool members is the sum of study area test period forecasts.

UCM models were estimated for (natural logarithm of) line count series. The basic model was specified, in its most general form, to account for historical patterns, such as seasonality, individual growth rate, and recent trends of line count series of each study area and includes:

- stochastic intercept component
- stochastic slope component
- stochastic seasonality component[11]

The model is specified as follows:

$$y_t = \mu_t + \gamma_t + \epsilon_t,$$

where μ_t is a locally linear trend component, γ_t is a seasonal component, and ϵ_t is an irregular (or error) component which is assumed to be Gaussian white noise.

Locally linear time trend μ_t is specified as:

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[10] Model specification and goodness of fit statistics for each study area are available upon request.

[11] *See* SAS Institute Inc. 2011. "SAS/ETS® 9.22 User's Guide", Cary, NC: SAS Institute Inc.

$$\mu_t = \mu_{t-1} + \beta_{t-1} + \eta_t, \quad \eta_t \sim i.i.d.\, N(0, \sigma_\eta^2),$$

and

$$\beta_t = \beta_{t-1} + \xi_t, \quad \xi_t \sim i.i.d.\, N(0, \sigma_\xi^2).$$

The term "stochastic" above refers to the case where σ_η^2 and σ_ξ^2 are positive. Observe that when $\sigma_\xi^2 = 0$, μ_t reduces to random walk with deterministic drift, and when $\sigma_\xi^2 = \sigma_\eta^2 = 0$, μ_t is just a linear time trend.

Seasonal component of length $s = 12$ months is characterized by the system of equations:

$$\sum_{i=0}^{s-1} \gamma_{t-i} = \omega_t, \quad \omega_t \sim i.i.d.\, N(0, \sigma_\omega^2).$$

Similar to the definitions above, when $\sigma_\omega^2 = 0$ the seasonal component is deterministic and can be thought of as a collection of $s - 1$ dummy variables corresponding to months of the year except one. When $\sigma_\omega^2 > 0$ the seasonal component is stochastic and evolves over time.

To estimate the line count model for each study area, the general model was refined to either restrict a specific component to be deterministic, or to drop it from specification for that particular study area on the basis of a significance test with ex-post verification by Akaike Information Criterion.

After the models were estimated at the study area level, the forecasts generated by the models were checked for reasonableness. In particular, the forecasted growth rate of line counts for the study area was compared with the historical growth rate for that study area and with the pool average forecasted growth rate. In cases of substantial difference between the forecasted

growth rate and the historical and/or pool average growth rate, the forecast was individually re-examined and, if necessary, re-estimated.

For the Common Line pool member study areas that had not been in the pool long enough to estimate their demand based on a robust model, the forecast for the test period was made on the basis of fitting a log-linear trend between company-provided forecasts for December 31, 2022, December 31, 2023 and December 31, 2024. For the rest of the study areas a model forecast was used to populate monthly values between January 2023 and December 2024 after rescaling it to exactly match December forecasts provided by the member companies.

After combining forecasts for the consistent set of companies with the companies not in the consistent sample, the projected NECA Common Line pool total access lines annualized growth rate from year 2022 to the 2023/2024 test period is -7.2 percent.

B.   ACCESS LINES DEMAND FORECASTS BY SERVICE CATEGORY

NECA worked cooperatively with member companies to develop service category access line forecasts. These forecasts served as the basis for developing NECA's End User revenue projections. NECA Common Line participant study areas provided NECA with line count history and forecasts by the following service categories: Residence Customer Premises Terminations (CPTs), Lifeline Assistance CPTs, Single-Line Business CPTs, Multi-Line Business CPTs, Residential Centrex CPTs, Business Centrex CPTs, Basic Rate Interface ISDN arrangements, Primary Rate Interface ISDN arrangements, DS1 Channel Service arrangements, total payphone stations, payphone stations subject to FUSC, Special Access Surcharge channels and Unbundled Network Element (UNE) lines.

To generate the service level forecasts and End User revenue forecasts by service category, NECA followed the steps below:

1. Calculated December 31, 2022, December 31, 2023 and December 31, 2024 service category shares of total study area access line counts based on data collected from NECA Common Line pool participants in February 2023.

2. Linearly interpolated access line shares by service category for intermediate months.

3. Applied monthly service shares to monthly study area total access line forecasts to obtain monthly service category line count forecast by study area.

4. Calculated service category End User revenue by applying end user rates to each study area's average monthly access line counts by service category for the 2023/2024 test period.

The pool level access line counts by service category are shown in Volume 3, Exhibit 1, Workpaper 1.

C.   CBOL DEMAND FORECAST

NECA collected CBOL demand forecasts from all Common Line pool members. Cost companies reported CBOL demand projections for calendar years 2023 and 2024 with their 2023 cost forecasts. Test period 2023/2024 projections were calculated as an average of the companies' 2023 and 2024 annual projections. For average schedule companies, test period 2023/2024 CBOL demand projections were collected as part of the 2023 Annual Forecast Line Count Data Collection.

Members had an opportunity to update the forecasts before final Form 508 certification were filed on March 31, 2023 with USAC and in exceptional circumstances following the filing of Form 508. All such updates were certified by the member companies.[12]

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[12] *See* Vol. 1, Appendix D for details.

Volume 3

DEVELOPMENT OF BASELINE DEMAND AND REVENUE

Section 3

INTERSTATE AND INTRASTATE LOCAL SWITCHING

DEMAND FORECASTS

A.   INTERSTATE LOCAL SWITCHING MINUTES OF USE DEMAND FORECAST

1.   Interstate Local Switching Minutes Aggregate Level Forecast

NECA developed its interstate MOU guidance forecasts for TS pool participants using a

time series technique known as an Autoregressive Integrated Moving Average (ARIMA).[13] This

forecasting technique predicts a value in a response time series as a linear combination of its own

past values and past errors (also called shocks or innovations), using the natural log of interstate

LS MOU as inputs.

NECA developed the aggregated MOU of a consistent sample of companies meeting four

criteria:

(1)   They were in the NECA pool throughout the period from January 2003 through

December 2022 and reported their interstate LS MOU to NECA.

(2)   They elected to remain in the TS pool during the 2023/2024 Test Period.

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[13] For a description of ARIMA, *see* Hamilton, J. D. 1994. "Time Series Analysis, Chapter 15: Models of Nonstationary Time Series", Princeton University Press, Princeton, NJ.

(3)   They neither bought nor sold exchanges during the period from January 2003

through December 2022.

(4)   They did not experience any major decline in demand due to the loss of major

customers.

The specific ARIMA model fitting this set of companies' historical MOU data best was

selected as NECA's aggregate MOU forecasting model. The forecast model was specified as

follows:

The log of interstate LS MOU was differenced by taking twelve-month differences to

remove seasonal effects and produce a stationary series.

Independent variables may include:

• Intercept (MU)

• Lags of the dependent variable (AR variables)

• Lags of the error term (MA variables)

• Dummy variables to eliminate the effect of a structural change in the historical

data series

The results of NECA's Interstate LS MOU aggregate model are shown below.

Interstate LS MOU ARIMA model estimation:

Variable	Coeff.	Std. Error	T-Stat.
MA1,1	0.47817	0.06472	7.39
AR1,1	1.3026	0.06759	19.27
AR1,2	-0.50837	0.11012	-4.62
AR1,3	0.24966	0.11343	2.2
AR1,4	-0.28661	0.11257	-2.55
AR1,5	0.37281	0.11105	3.36
AR1,6	-0.13102	0.0695	-1.89
Out_202208	-0.03942	0.01947	-2.02

R^2	0.9989	Durbin-Watson	2.5877
Observations	228	Degrees of Freedom	219
Estimation Interval	200301 – 202212		

These diagnostics indicate the model captures the underlying demand behavior well. The t-statistic is highly significant. The Durbin-Watson test indicated the absence of serial correlation in the residual series. The projected growth in demand from fiscal year 2022 to the 2023/2024 test period results in an annual decline in total minutes of 17.3 percent for the consistent sample used for MOU analysis.

2.   Study Area Level Interstate MOU Forecast

To develop study area level MOU forecasts, a five-step procedure was used.

(1)   Aggregated MOU monthly historical and forecasted levels for the consistent sample served as the baseline for developing study area specific forecasts.

(2)   For each study area in the consistent sample, a preliminary forecast was generated by applying a UCM method[14] and the associated monthly shares were derived based on the ratio of the monthly projection relative to the total projection. By applying the monthly shares to the aggregate MOU monthly forecasts obtained from step (1), the study area level monthly forecasts were produced.

(3)   For each study area not in the consistent sample, because there are not enough observations to develop statistical models, the UCM method was not used. Forecasts for these study areas were computed using the average proportion of their minutes to the aggregate minutes of the consistent sample for the period October through December 2022 for Non-Alaskan companies and from January through December 2022 for Alaskan companies.[15]

(4)   Projected minutes for the consistent sample companies and companies not part of the consistent sample were combined to produce the study area interstate MOU forecasts for the total NECA pool.

(5)   The study area interstate MOU forecasts were used to pre-populate the interstate MOU field of the CAF ICC Data Collection system. Companies had the flexibility to override it with their own forecasted minutes.

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[14] *See* Volume 3 Section 2.A for a detailed description of UCM method.

[15] In order to capture a 12-month seasonality cycle exhibited by Alaskan companies's data series, January through December 2022 is used as a base period to generate the forecasts for this group of companies.

About 61.1 percent of member companies used NECA's projection of interstate minutes and the rest of the companies replaced NECA's projections with their own. The test period annualized growth rate for the total pool is -14.1 percent based on the combined NECA and company projections.

B.   INTRASTATE SWITCHED ACCESS DEMAND FORECAST

In order to develop Access Recovery Charge (ARC) and Connect America Fund Intercarrier Compensation (CAF ICC) support, NECA developed a web application to collect its TS pool members' test period forecasts of intrastate MOU and access lines by three major service categories (residential, single-line business, and multi-line business). Starting with test period 2021/2022, reciprocal compensation minutes are no longer collected as they are under bill and keep rates and no longer generate revenues.

NECA also collected fiscal year 2022 intrastate and interstate minutes to calculate test period annualized growth rates. In addition to demand quantities, the web system also collected local charges by exchange/rate zone, state support amounts and intrastate switched access terminating revenue which were used to calculate the test period revenue.[16] The pool level projections of interstate switched MOU and intrastate switched MOU for NECA's Traffic Sensitive pool members are summarized in Volume 3, Exhibit 2, Workpaper 1.

Appendix B details the CAF ICC Data Collection system, process, and data field definitions.

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[16] *See* Volume 5 Section 4.B for a detailed description of development of ARC and CAF ICC.

Volume 3

DEVELOPMENT OF BASELINE DEMAND AND REVENUE

Section 4

INTERSTATE SPECIAL ACCESS DEMAND FORECASTS

A.   <u>INTERSTATE SPECIAL ACCESS AGGREGATE LEVEL FORECASTS</u>

NECA's special access aggregate demand forecasts include two categories: special access revenue forecasts and DSL line forecasts. The demand forecasts are the sum of forecasts for the following sets of study areas:

1.   Study areas that have been in the pool since July 2013 and subscribe to NECA's special access tariff or DSL tariff in the entire period (named consistent sample)

2.   Study areas subscribing to NECA's tariff but excluded from the consistent sample because of at least one of the following reasons:

   a.   they were not in the TS pool or the DSL pool for the entire period,

   b.   they have bought (or sold) exchanges since July 2013,

   c.   they have incomplete data series.

3.   Study areas entering NECA's TS pool or DSL tariff on July 1, 2023.

The special access revenue forecasts are separated according to service type, i.e. DSL and Non-DSL revenue. DSL revenue and DSL line forecasts include forecasts for all study areas subscribing to NECA's DSL tariff. Non-DSL revenue forecasts include forecasts for all study areas subscribing to NECA's special access tariff.

1.   Special Access Revenue Aggregate Forecast

NECA used the ARIMA time series technique[17] to develop test period special access

constant rate (unbanded) revenue forecasts for Non-DSL and voice-data DSL service categories.

The constant rate revenue excluded historical banding and rate change impacts on billed revenue

so that the data series are indexed on a uniform basis. The practice is to separate the individual

study area's billed revenue from the pricing (or banding) factors which represent the

premium/discount ratios associated with companies' specific bands and the uniform rate index

which represents the rate change history. Given the different historical growth patterns in the

voice-data DSL revenue, Non-DSL Non-ETS revenue and Non-DSL ETS revenue data series,

they were projected separately. The aggregate forecast model was specified as follows:

> The log of interstate voice-data DSL, Non-DSL Non-ETS or Non-DSL ETS constant rate
>
> revenue was differenced using adjacent months to produce a stationary series. Dummies
>
> were tested for the rate-change months and the adjacent months. The dummy variables
>
> were designed to eliminate the residual rate-change effect on the historical special access
>
> constant rate revenue series which was not captured by the constant rate conversion
>
> process. Independent variables may include:

- Intercept (MU)

- Lags of the dependent variable (AR variables)

- Lags of the error term (MA variables)

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[17] *See* discussion relating to forecasting interstate LS MOU in Section 3.A

- Dummy variables to eliminate the effect of a structural change in the historical data series

The results of NECA's special access constant rate revenue aggregate models for voice-data DSL service are shown below.

Voice-data DSL constant rate revenue ARIMA model estimation:

Variable	Coeff.	Std. Error	T-Stat.
MA1,1	-0.33972	0.09828	-3.46
Out_202207	-0.0061499	0.0029962	-2.05

R^2	0.9898	Durbin-Watson	1.9743
Observations	113	Degrees of Freedom	110
Estimation Interval	201307 – 202212		

The model produced a total consistent sample test period annualized special access voice-data DSL constant rate revenue[18] growth rate of -7.5 percent.

The models projecting Non-DSL Non-ETS and Non-DSL ETS constant rate revenues used historical data series starting in July 2016 which corresponds to the first month in which these two services were assigned separate rate bands. The tables below show the results of NECA's special access Non-DSL Non-ETS and Non-DSL ETS constant rate revenue aggregate models.

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[18] All revenues are at current unbanded rates or adjusted for banding and rate change impacts.

Non-DSL Non-ETS constant rate revenue ARIMA model estimation:

Variable	Coeff.	Std. Error	T-Stat.
MU	-0.01292	0.0012007	-10.76
MA1,1	1.44361	0.23844	6.05
MA1,2	-0.53157	0.13148	-4.04
AR1,1	0.87788	0.24625	3.57

R^2	0.9974	Durbin-Watson	1.9911
Observations	77	Degrees of Freedom	72
Estimation Interval	201607 – 202212		

Non-DSL ETS constant rate revenue ARIMA model estimation:

Variable	Coeff.	Std. Error	T-Stat.
MU	0.0090793	0.0011816	7.68
AR1,1	-0.49555	0.10033	-4.94

R^2	0.9952	Durbin-Watson	2.0376
Observations	77	Degrees of Freedom	74
Estimation Interval	201607 – 202212		

The statistics for both models indicated the models fit historical data well. The Durbin-Watson test indicated the absence of serial correlation in the residual series.

The Non-DSL Non-ETS model produced a consistent sample test period annualized constant rate revenue growth rate of -15.6 percent and the Non-DSL ETS model produced a consistent sample test period annualized constant rate revenue growth rate of 11.3 percent. The

aggregate annualized total special access Non-DSL constant rate revenue growth rate for the

consistent sample was -9.0 percent.

For study areas not in the consistent sample groups, NECA produced forecasts based on

each company's specific historical proportions to aggregate revenue of the consistent sample for

the voice-data DSL, Non-DSL Non-ETS and Non-DSL ETS categories respectively.

NECA developed second mile transport broadband-only DSL revenue projections for

study areas having 2nd-mile transport by pricing out projected broadband-only DSL lines.[19]

The sum of these projections produced an aggregate annual growth rate of -7.6 percent

for NECA's total pool special access constant rate revenue.

2.   Special Access DSL Lines Aggregate Forecast

Voice-data DSL lines aggregate forecasts follow the same procedure applied for

projecting voice-data DSL revenue. NECA used monthly aggregate voice-data DSL lines data

series starting from July 2013 to estimate an ARIMA model and develop voice-data DSL lines

forecasts for the 2023/2024 test period. The results and the model significance analysis are

shown below.

Voice-data DSL lines ARIMA model estimation:

Variable	Coeff.	Std. Error	T-Stat.
MA1,1	0.19429	0.09689	2.01
AR1,1	0.61637	0.0894	6.89
AR1,2	0.31707	0.09225	3.44
Out_202212	-0.0037119	0.0025424	-1.46

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[19] Refer to Section 4B for details.

R^2	0.9990	Durbin-Watson	2.4734
Observations	113	Degrees of Freedom	108
Estimation Interval	201307 – 202212		

The statistics indicate the models fit historical data well. The Durbin-Watson test indicated the absence of serial correlation in the residual series. The model produced a -7 percent test period annualized growth rate for voice-data DSL lines for this group of study areas.

B.   INTERSTATE SPECIAL ACCESS STUDY AREA LEVEL FORECASTS

NECA applied the same procedure used for study area interstate local switching minutes demand forecasts to develop individual study area special access voice-data DSL, Non-DSL Non-ETS and ETS constant rate revenue forecasts and voice-data DSL lines forecasts. For each study area in the consistent sample, a test period monthly share was developed based on its monthly share of total special access revenue obtained from the UCM method relative to the corresponding pool aggregate revenue. By applying the series of monthly shares to the aggregate forecasts from section A, the study area special access voice-data DSL, Non-DSL Non-ETS and Non-DSL ETS constant rate revenue forecasts and voice-data DSL line forecasts were derived. The UCM estimation results for individual study areas are available upon request.

For study areas not in the consistent sample, that do not have enough data points to develop statistical models, forecasts of voice-data DSL, Non-DSL Non-ETS and Non-DSL ETS constant rate revenue forecasts and voice-data DSL lines were computed using the average proportion of their revenue to the corresponding aggregate revenue for the consistent sample for

the period October 2022 through December 2022 for non-Alaskan companies and from January 2022 through December 2022 for Alaskan companies.

To generate the study area level forecasts of broadband-only second mile transport DSL revenues, NECA followed the steps below:

1. For cost companies providing broadband-only DSL lines with their 2023 cost forecasts, NECA averaged the broadband-only DSL lines reported for calendar year 2023 and 2024.

2. For cost companies not providing broadband-only DSL lines with their 2023 cost forecasts and for average schedule companies, NECA used certified broadband-only projections from Form 508 data.

3. For study areas not providing broadband-only DSL lines in either the cost forecast or Form 508 filing as described in step 1 and 2, NECA projected broadband-only DSL line counts by applying the historical growth rate of all study areas to the historical broadband-only DSL lines.

4. For companies with projected second mile transport, NECA multiplied their current broadband-only rate (after the appropriate discount) by the projected broadband-only lines from 1, 2 and 3, and then multiplied by 12.

C.   SPECIAL ACCESS REVENUES AND DEMAND AT RATE ELEMENT LEVEL

In the past, NECA maintained rate element level demand detail in its Tariff Element Tracking (TET) System, a database containing CABS information. TET consisted of 109 study areas in NECA's TS pool that billed Special Access revenues in 2015. Because of changes in TS pool participation, NECA stopped maintaining the TET system. To estimate rate element level

demand for the traditional special access services (Voice Grade, High Capacity DS1 and DS3,

etc.), NECA used the frozen view of the revenue shares and the demand growth rates from the

2015 TET data.

To supplement the TET data, NECA gathered additional data from the Advanced

Services Demand Data Request to develop rate element level demand forecasts for advanced

services (DSL, DSL Connection Points, ATM, Frame Relay, SONET, ETS, and IP Gateway

Access Service), because these services were not well represented in the TET data. NECA priced

out demand collected in the Advanced Services Demand Data Request to estimate advanced

services revenue, then subtracted this revenue from the aggregate Special Access revenue

estimate to derive revenue associated with the traditional special access services represented in

TET. To develop the forecasts for traditional Special Access services at the rate element level,

NECA used the following process:

1. Use the frozen share of TET revenue and the frozen growth rate for each TET
    element based on the 2015 TET data.[20]

2. Expand each element's revenue to the traffic sensitive pool level by applying the
    resulting revenue shares to estimated 2022 Special Access revenue net of
    advanced services at the current uniform rates.

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[20] For the frozen view, NECA priced demand in TET at June 30, 2016 uniform (unbanded) rates to estimate
2015 revenue at constant rates. Then NECA computed the frozen share of TET revenue for each TET element. The
frozen growth rates were derived based on comparisons of the demand for eight broad categories of traditional
Special Access services recorded in TET in the second half of 2015 relative to the first half of 2015.

3.   Derive rate element demand at the pool level by dividing each element's

estimated 2022 revenue by its corresponding June 30, 2023 uniform rates with

adjustments for the pool composition of the new test period.

4.   Estimate demand for the 2023/2024 test period, by applying a frozen growth rate

to each element's 2022 demand.

5.   Multiply the estimated 2023/2024 test period rate element demand levels by the

current uniform rate to arrive at test period revenues at current rates, which are

then scaled to correspond to the Special Access test period revenue forecast for

traditional services.

6.   Divide these revenues by the current uniform rate to arrive at rate element

demand at the pool level for the test period. The demand trends for the major

components of Special Access services are displayed in Volume 3, Exhibit 3,

Workpapers 1 and 2.