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March 18, 1997

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Federal Communications Commission
Office of Secretary

Mr. William F. Caton
Secretary
Federal Communications Commission
1919 M. St., NW, Room 222
Washington, D.C. 20554

RE: Ex Parte Presentation
Universal Service: CC Docket No. 96-45
Access Reform: CC Docket No. 96-262

Dear Mr. Caton,

AT&T and MCI met today with Anthony Bush, Patrick DeGraba, William Sharkey and Bradley Wimmer of the Common Carrier Bureau staff. Discussed at this meeting were discuss certain aspects of the Hatfield Model, Release 3.1, aspects of other models or cost methodologies, and the calculation of universal service expenses. Representing AT&T were myself and Michael Lieberman. Christopher Frentrup represented MCI. A copy of the presentation materials that were discussed at this meeting is attached.

Two copies of this Notice are being submitted to the Secretary of the FCC in accordance with Section 1.1206(a)(1) of the Commission's rules.

Sincerely,

Richard N. Clarke

Attachments

cc: Anthony Bush
Patrick DeGraba
William Sharkey
Bradley Wimmer
Whitey Thayer
Robert Loube
Emily Hoffnar
David Krech
Brian Clopton

Modeling Forward-Looking Economic Costs

Why Hatfield is Superior to Competing Models and Methods

Hatfield Model by
Hatfield Associates
for AT&T and MCI

FCC and
Federal-State Joint Board
March 1997

Modeling Issues

- Reliability of HM 3.1
  - Structure sharing
  - Engineering of long loops
  - Derivation of corporate overheads
- Validation of HM 3.1 against other data
- Frailties of using other models or methods to infer forward-looking economic costs
  - other proxy models
  - "models"/methods using embedded costs

Universal Service Issues

- Estimates of USF obligation by state and company type
- Household count issues
- Comparison with other other models and data
  - BCPM
  - UNEs
- Why negotiated/arbitrated state UNE rates are an inappropriate basis for national USF calculations

Reliability of HM 3.1

- Structure sharing
  - Historically, utilities have had incentives to resist
  - Nonetheless, it is already widespread
  - Utilities project substantial increases in the future
  - See attached write-up supporting HM assumptions
- Engineering of long loops
  - Long loops, engineered with coarse gauge wire and load coils can support V.34 modem data throughput
  - Nevertheless, long loaded loops are extremely uncommon in HM 3.1

Validation of HM 3.1

- Comparison of line counts by wire center
  - Missouri
  - New York
  - Texas
- Concordance of results with those of BCPM
  - Differences due to different input assumptions
  - Differences due to non-user adjustable structural inefficiencies in BCPM network engineering
- Relationship of HM 3.1 and BCPM results with NECA USF data

Embedded Cost Models

- SPR's "model" demonstrates exactly why embedded cost data cannot be used to identify forward-looking economic costs
- SPR assumes that all new LEC plant incorporates forward-looking technology
  - LECs deploy old technology to maintain compatability with embedded plant and maintenance training
- SPR assumes that monopoly LECs expand capacity efficiently

Embedded Cost Models

- SPR assumes that current LEC investment drives current LEC output expansion
  - Current output expansion actually makes use of assets deployed over past 30+ years
  - Minimal time series cannot capture causality
- OLS estimation is inappropriate to capture relationships in panel data sets
- "Result" that incremental cost estimated from a model linear in embedded costs equals average embedded cost is predetermined

Embedded Cost Models

- SPR results are internally inconsistent
  - Finding that incremental cost is invariant over time is inconsistent with studies of LEC "X" and TFP
  - Finding that cost of switched loops differs from non-switched loops
  - Use of serving area unadjusted for empty sections
  - Finding of largest variation being cross-sectional is at odds with hypothesis of lines density rather than absolute size as the driver of costs
- If ILECs are already completely efficient, why introduce competition?

USF Issues

- Estimates of USF obligation by state and company type
- Household count issues
- Comparison with:
  - BCPM
  - NECA USF data
  - UNE rates
- Hatfield displays greatest stability relative to alternative models and methods

UNEs to Determine USF?

- Negotiated/arbitrated state UNE rates are:
  - Do not exist for all large LECs
  - Vary among CLECs interconnecting with the ILEC
  - Frequently are interim, only
  - Frequently are being subjected to court review
  - Reflect little or no zone variation with the study area
- Using state UNEs to determine national USF draws is not incentive-compatible
  - Share of N-USF to be received can be manipulated
  - Simultaneously, local competition is subverted

Summary

- The Hatfield Model comports reasonably with other cost data
- Its scope, accuracy and flexibility of calculation exceeds that of all alternative models or methods
- Its calculations of basic local service costs are the most reasonable and incentive-compatible basis for computing USF requirements

Hatfield Model, Release 3

Forward-Looking Economic Costs of Universal Service, Carrier Access and Unbundled Network Elements

Model Developed by
Hatfield Associates
for AT&T and MCI

Universal Service Joint Board
Washington, D.C.
February 1997

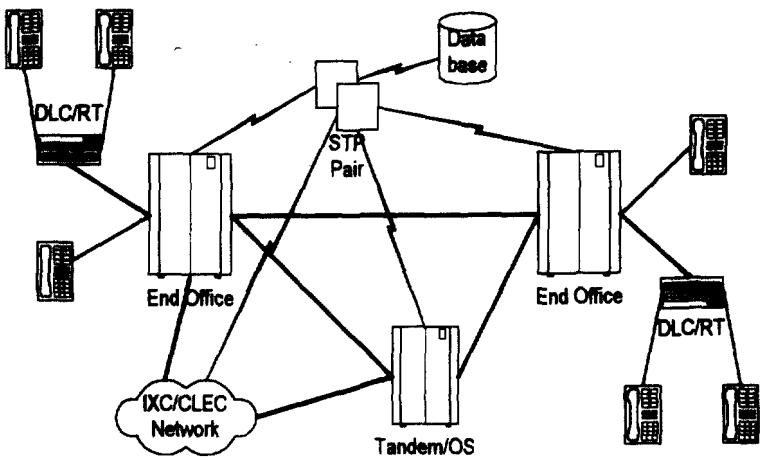
Presentation overview

- What is the Hatfield Model?
- What network elements does it model?
- How does the Hatfield Model work to calculate forward-looking economic costs?
- Comparison of Hatfield Model with other proxy cost models

What is the Hatfield Model?

- A model of a reconstructed local exchange network that assumes:
  - Modern technology will be employed in efficient network configurations
  - Wire centers will remain in their current locations
  - All narrowband demand in area will be served
  - Carrier will operate using efficient practices
- The cost of such a network would equal that incurred by an efficient competitor

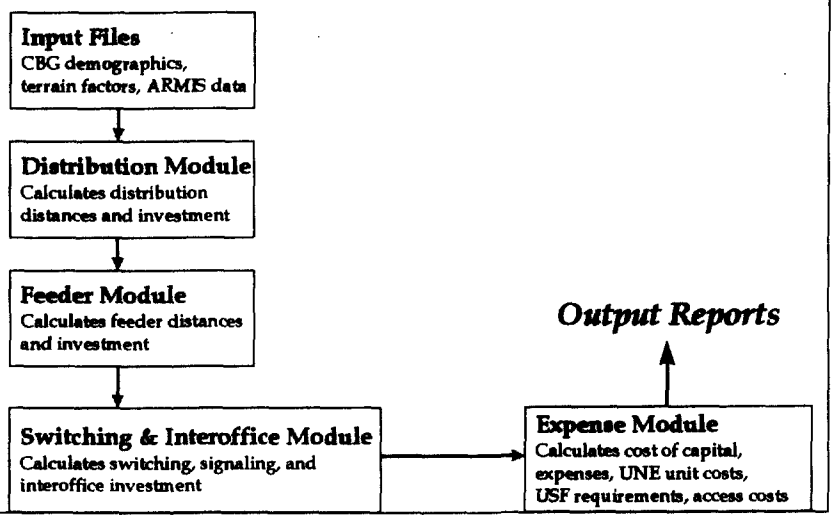
Complete Local Network Modeled



What does Hatfield calculate?

- Cost of unbundled network elements
  - Loop (NID/Dist'n/DLC/Feeder) by density zone
  - Local/tandem switching
  - Interoffice transport
  - Signaling systems and databases
  - Operations support systems
  - Operator systems and public phone services
- Cost of universal service by density zone
- Cost of carrier access and other interconnection services

Release 3 flowchart



Input Data

- Determination of lines/minutes/call attempts demand quantities in each CBG
  - Residence / Business / Public / Special
- PNR/Donnelly/Claritas/U.S. Census determination of residential first and "second" lines
  - Using age and income demographics
- PNR/Dun & Bradstreet determination of business lines
  - Using employees and SIC telephone intensity

Input Data

- PNR assignment of CBGs to serving wire centers
  - Based on mode wire center as determined by Donnelly list of geo-coded NPA-NXXs
- Traffic quantities
  - From ARMIS
- User-adjustable inputs
  - National default values pre-entered
  - Integrity of the model depends on the reasonableness of these parameter values

Loop Investments

- Distribution cable quantities calculated to ensure all demand is served
  - Empty CBGs and empty area within CBGs
  - Grid / clustering patterns
  - High-rise patterns
  - Extension of feeder into CBG quadrants
- Engineering of longer distribution loops
  - Ensures high quality voice and data transmission performance
  - Is economical for universal service

Loop Investments

- Feeder is either copper or fiber
  - Based on user-adjustable crossover point
  - Default is 9000 feet
- Fiber feeder is used to carry modern Integrated Digital Loop Carrier (IDLC)
  - Bellcore TR-303 compliant
  - 100% redundant

Switching Investments

- Logarithmic switching investment curve
  - Large LECs (larger vendor discounts)
  - Small LECs (smaller vendor discounts)
- Switches sized to serve specific demands placed on them
  - Lines / minutes / call attempts / holding time
  - Engineered with required administrative underfill

Interoffice Investments

- Trunking is over a combination of SONET fiber rings and point-to-point facilities
- Costs calculated for:
  - Dedicated access (including entrance facilities)
  - Common (EO-Tandem) transport
  - Direct (EO-EO) transport
- SS7 signaling network including:
  - Signaling links
  - Signal Transfer Points (STPs)
  - Databases / Service Control Points (SCPs)

Expenses

- Depreciation
  - Calculated for 23 separate plant categories
  - Based on approved economic projection lives adjusted for net salvage value
- Cost of capital calculations based on midyear net investments
- Income tax gross-ups on equity returns
- Fully adjustable returns to debt and equity and D/E ratio

Expenses

- Forward-looking operating expenses disaggregated across multiple categories based on:
  - Amount of investment supported
  - Number of lines served
- Corporate overheads
  - Computed explicitly for General Support Facilities
  - Additionally added as a percentage of direct costs
- Regional labor cost adjustments possible

Output Reporting

- By nine lines density zones
  - Further disaggregated by DLC/nonDLC lines
- By wire center
- By individual CBG
- Costs disaggregated by:
  - USF cost elements (loop, switch, transport, signaling, retail) with user-adjustable definition of supported basic service)
  - Fifteen unbundled network elements
  - Carrier access and interconnection

How Hatfield Builds Costs

- Determines customer demand
  - By geographical location, customer and service type
- Calculates efficient facilities investment required to serve demand
  - Materials / placement / installation
- Calculates capital carrying cost
  - Depreciation / return / taxes
- Adds network operations and support expenses
- Adds share of corporate overheads
- Adds sales/retail expense as appropriate

Running the Hatfield Release 3

- Basic model is written in Microsoft Excel
- Interface is Visual Basic
- Access database used to store data and scenarios
- All data and calculations are visible and auditable -- nothing locked
- Runs much quicker than v.2.2.2
- Can run on a typical desktop PC

Comparison With Other Models

Hatfield R3

- Combination of copper and DLC on fiber loop plant
- Digital end office and tandem switching
- SONET ring and point-to-point fiber interoffice transport
- SS7 signaling
- Public and operator

BCPM

- Combination of copper and DLC on fiber loop plant
- Digital end office switching, no tandems
- No interoffice transport modeled
- No signaling modeled
- No public phone or operator services

Comparison With Other Models

Hatfield R3

- Accurate count of res/bus lines by CBG
- Assignment of CBGs to wire center based on actual NPA-NXXs
- Usage (DEMs / call attempts) modeled

BCPM

- Imprecise count of res/bus lines by CBG
- Assignment of CBGs to wire center based on geographic centroid
- Usage not modeled

Comparison With Other Models

Hatfield R3

- Investments in entire network (loop, switching, transport, signaling, etc.) built explicitly
- Explicit calculation of monthly costs for 15 UNEs, disaggregated basic/universal service, and carrier access and interconnection

BCPM

- Loop and and partial switching investment built explicitly
- Explicit calculation of monthly costs for aggregated basic/ universal service

Comparison With Other Models

Hatfield R3

- Outputs reported at density zone, wire center or CBG level
- Analysis is auditable
  - Calculations open
  - Input data public
  - Outputs disaggregated
- Results specific to state, and COSA for USF, UNEs, and access

BCPM

- Outputs at density zone, wire center or CBG level
- Analysis is unauditable
  - Calculations black box
  - Input data proprietary
  - Outputs aggregated
- General results for USF

Summary

- The Hatfield Model calculates accurately the efficient forward-looking cost of both Universal Service and Unbundled Network Elements
- The Hatfield Model permits flexible analyses using data and input values that are are specific to the state/geography studied, e.g.,
  - Rate of return
  - Depreciation
- Output information is granular and exhaustive

Release 3.1 Enhancements

- Inclusion of data for all COSAs in 49 states
- Correction of data error in assignment of CBGs to wire center quadrant
- Clean up of transport/signaling and tandem switching calculations
- Documentation enhanced
- Display of all outputs (investments, monthly costs and USF support) by density zone, wire center and CBG

Hatfield Model, Release 3

Why it is Superior to Competing Models and Methods

Model Developed by
Hatfield Associates
for AT&T and MCI

NARUC Meetings
Washington, D.C.
February 1997

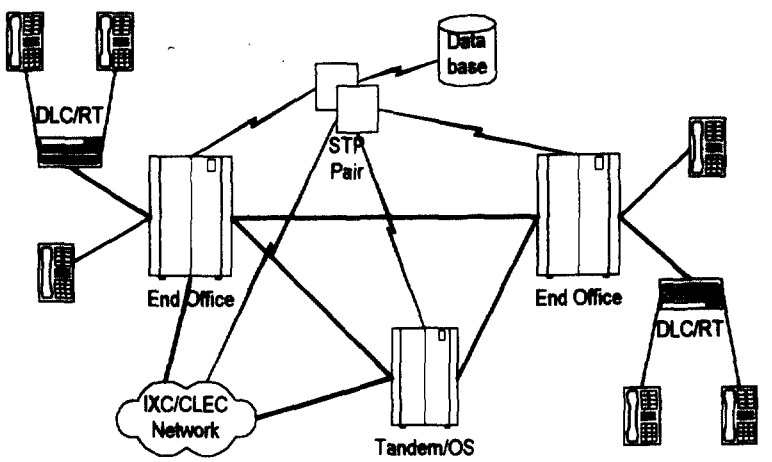
Evaluative Criteria

- Completeness
- Accuracy
- Consistency
- Flexibility
- Auditability

Completeness

- The Hatfield Model models explicitly the entire local network
  - Loop
  - End office switching
  - Interoffice transport
  - Signaling
  - Operator and public telephone services
- Only the Hatfield Model can assure a completely costed network that meets required service and quality specifications

Complete Local Network Modeled



Accuracy

- The Hatfield Model's input data precisely:
  - Determine res/bus line demand by geographical location
  - Associate customer lines with the wire centers that actually serve them
  - Profile the rich usage characteristics of the served customer lines
- Loop plant is sized to serve the particular location patterns of customers within a geography
  - Grid/clustering, high-rise, empty areas

Accuracy

- Switching plant is engineered to serve actual bus/res customer demands for:
  - Minutes / call attempts / holding times
  - Busy hour usage
  - Features
- SONET ring and point-to-point fiber optic interoffice transport
- SS7 signaling network to ensure efficient:
  - Interoffice, CLASS, 800, OS and Emergency calling
  - Network security and survivability

Consistency

- Hatfield calculates costs consistently for all uses of the local exchange network:
  - Basic/universal service (broken down by loop, switch, transport, signaling, retail)
  - Toll service
  - Unbundled network elements
  - Carrier access and interconnection services
- Ensures appropriate recognition and distribution of costs and economies

Flexibility

- Hatfield's massive number of user-adjustable inputs permit analyses to be customized to the particular features of a state or study area
  - Examples: Lot sizes/configurations, equipment depreciation rates, labor costs, etc.
- Hatfield also permits analyses of the different network costs imposed by:
  - Business vs. residence calling
  - Internet usage
  - Custom feature usage or other unusual usages

Auditability

- Analysis is auditable
  - Calculations open
  - Input data public and verified
  - Intermediate steps visible
- Outputs reported at:
  - Density zone, wire center or CBG level
  - Disaggregated by network element
  - Separately by type of service

Summary

- The Hatfield Model calculates completely, accurately, consistently, flexibly and auditably the efficient forward-looking cost of:
  - Universal Service
  - Unbundled Network Elements
  - Carrier access and interconnection
- The Hatfield Model permits flexible analyses and provides output information that is granular and exhaustive

Structure Shares Assigned to Incumbent Local Telephone Companies

Overview

Due to their legacy as rate-of-return regulated monopolies, LECs and other utilities have heretofore had little incentive to share their outside plant structure with other users. To share would have simply reduced the "ratebase" upon which their regulated returns were computed. But today and going forward, LECs and other utilities face far stronger economic and institutional incentives to share outside plant structure whenever it is technically feasible. There are two main reasons. First, because utilities are now more likely to either face competition or to be regulated on the basis of their prices (e.g., price caps) rather than their costs (e.g., ratebase), a LEC's own economic incentive is to share use of its investment in outside plant structure. Such arrangements permit the LEC to save substantially on its outside plant costs by spreading these costs across other utilities or users. Second, many localities now strongly encourage joint pole usage or trenching operations for conduit and buried facilities as a means of minimizing the unsightliness and/or right-of-way congestion occasioned by multiple poles, or disruptions associated with multiple trenching activities.

Because of these economic and legal incentives, not only has structure sharing recently become more common, but its incidence is likely to accelerate in the future – especially given the Federal Telecommunications Act's requirements for nondiscriminatory access to structure at economic prices.

The degree to which a LEC can benefit from structure sharing arrangements varies with the type of facility under consideration. Sharing opportunities are most limited for multiple use of the actual conduits (e.g., PVC pipe) through which cables are pulled that comprise a portion of underground structure. Because of safety concerns, excess ILEC capacity within a conduit that carries telephone cables can generally be shared only with other low-voltage users, such as cable companies, other telecommunications companies, or with municipalities or private network operators. Although the introduction of fiber optic technology has resulted in slimmer cables that have freed up extra space within existing conduits, and thus enlarged actual sharing opportunities, the Hatfield Model does not assume that conduit is shared because as a forward-looking model of efficient supply, it assumes that a LEC will not overbuild its conduit so as to carry excess capacity available for sharing.

Trenching costs of conduit, however, account for most of the costs associated with underground facilities – and LECs can readily share these costs with other telecommunications companies, cable companies, electric, gas or water utilities, particularly when new construction is involved. Increased CATV penetration rates and accelerated facilities based entry by CLECs into local telecommunications markets will expand further future opportunities for underground structure sharing. In addition, in high density urban areas, use of existing underground conduit is a much more economic alternative than excavating established streets and other paved areas.

Sharing of trenches used for buried cable is already the norm, especially in new housing subdivisions. In the typical case, power companies, cable companies and LECs simply place their facilities in a common trench, and share equally in the costs of trenching, backfilling and surface repair. Gas, water and sewer companies may also occupy the trench in some localities. Economic and regulatory factors are likely to increase further incentives for LECs to schedule and perform joint trenching operations in an efficient manner.

Aerial facilities offer the most extensive opportunities for sharing. The practice of sharing poles through joint ownership or monthly lease arrangements is already widespread. Indeed, the typical pole carries the facilities of at least three potential users – power companies, telephone companies and cable companies. Power companies and LECs typically share the ownership of poles through either cross-lease or condominium arrangements, or through other arrangements such as one where the telephone company and power company each own every other pole. Cable companies have commonly leased a portion of the pole space available for low voltage applications from either the telephone company or the power company.