

# **HAI Model**

**Release 5.3**

*Model Description*

*Appendix A*

*History of the Hatfield/HAI Model*



## Appendix A

### History of the Hatfield/HAI Model

HAI Consulting, Inc., originally developed the HAI Model on behalf of AT&T and MCI Telecommunications Corporation (“MCI”) to produce estimates of the Total Service Long Range Incremental Cost (“TSLRIC”) of basic local telephone service as part of an examination of the cost of universal service. The original model was a “greenfield” model in that it assumed all network facilities would be built without consideration given to the location of existing wire centers. When several incumbent Local Telephone Companies (“ILECs”) and MCI introduced the original Benchmark Cost Model (“BCM1”)<sup>1</sup> in approximately 1995, HAI revised the original Hatfield Model to incorporate certain loop investment data produced by BCM1. As a result, the Hatfield Model adopted BCM1’s “scorched node” methodology of assuming that network wire centers remain at their current locations. HAI then combined investment outputs from the BCM1 loop modeling process, substantially modified by including the cost of items that were not included in the BCM1, with extensive wire center and interoffice and expense calculations enhanced from the earlier Hatfield Model, to develop a complete set of TSLRIC estimates for basic local service.

In early 1996, HAI developed an expanded version of the Model, referred to as the Hatfield Model, Version 2.2, Release 1 (“HM 2.2.1”), to estimate the costs of unbundled network elements. AT&T and MCI filed HM 2.2.1 with the Federal Communications Commission (“FCC”) in CC Docket No. 96-98 on May 16 and 30, 1996, accompanied by descriptive documentation.<sup>2</sup> On July 3, 1996, the companies also placed HM 2.2.1 into the record of CC Docket No. 96-45 to assist the Commission in determining the forward-looking economic costs of universal service.<sup>3</sup>

The Hatfield Model, Version 2.2, Release 2 (“HM 2.2.2”), introduced in late 1996, contained further enhancements to the Model. This version estimated the efficient, forward-looking economic cost of both unbundled network elements and basic local telephone service. It adopted modified versions of certain inputs and methods from the BCM-PLUS model, a derivative of BCM1 that MCI developed and copyrighted.

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<sup>1</sup> The Benchmark Cost Model is a model of basic local telephone service that was originally developed by MCI, NYNEX, Sprint, and U S WEST.

<sup>2</sup> See Appendix E of the *Comments* of AT&T in CC Docket No. 96-98, In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, and Appendix D of AT&T’s *Reply Comments* in that proceeding. In the same proceeding, MCI submitted results based on an earlier “greenfield” version of the Model as Attachment 1 to its *Comments*.

<sup>3</sup> See, FCC Public Notice, DA-96-1078, Released July 3, 1996 and DA 1094, Released July 10, 1996 (“*Cost Model Public Notice*”).

On August 8, 1996, the FCC released its First Report and Order in CC Docket No. 96-98 and CC Docket 95-185<sup>4</sup> (“*Local Competition Order*”). The *Local Competition Order* provided a comprehensive set of criteria for the arrangements through which the ILECs would offer unbundled network elements to competitive local exchange carriers (“CLECs”). The criteria included a definition of a cost-based methodology that should be used in setting the price of unbundled network elements. The FCC termed the methodology the “Total Element Long Run Incremental Cost,” or TELRIC. The methodology of the HAI Model is fully consistent with the TELRIC principles set forth in the *Local Competition Order* for calculating the cost of UNEs, and with TSLRIC principles for calculating the cost of basic local service.

AT&T and MCI used HM 2.2.2 as the basis for their recommended prices for unbundled network elements in a large number of state jurisdictions during the latter part of 1996 and the first half of 1997. The Model’s results were adopted in whole or in part in several of these proceedings. In the process, ILECs, state commission staffs, and other parties subjected the Model to thorough examination. This scrutiny, along with ongoing intense internal reviews, provided valuable insights into further desirable enhancements to the Model.

On November 8, 1996, the Federal-State Joint Board<sup>5</sup> (“Joint Board”) issued its Recommended Decision in CC Docket No. 96-45.<sup>6</sup> In addition to defining Universal Service, the Board also addressed the issue of determining the level of support required for universal service. In doing so, it found that:

. . . [a] properly crafted proxy model can be used to calculate the forward-looking economic costs for specific geographic areas, and be used as the cost input in determining the level of support a carrier may need to serve a high cost area. The Joint Board therefore recommends that the Commission continue to work with the state commissions to develop an adequate proxy model that can be used to determine the cost of providing supported services in a particular geographic area . . .<sup>7</sup>

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<sup>4</sup> Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, CC Docket No. 96-98, Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers, CC Docket No. 95-185, First Report and Order, 11 FCC Rcd 15499 (1996) (“*Local Competition Order*”).

<sup>5</sup> 47 U.S.C. § 254(a)(1). In the Joint Explanatory Statement, the Joint Board was directed to “thoroughly review the existing system of federal universal service support.” S. Rep. No. 230, 104th Cong., 2d Sess. 131 (1996) (Joint Explanatory Statement).

<sup>6</sup> In the Matter of Federal-State Joint Board on Universal Service, CC Docket 96-45, Recommended Decision, 12 FCC Rcd 87 (1996) (“*Recommended Decision*”).

<sup>7</sup> *Ibid.*, para. 268.

The FCC's Competitive Pricing Division Staff analysis of "The Use of Computer Models for Estimating Forward-Looking Economic Costs"<sup>8</sup> also provided an in-depth review of these issues. Further suggestions for the improvement of proxy models were advanced at workshops conducted by the FCC in cooperation with the Joint Board staff on January 14 and 15, 1997. Although the FCC and state staffs declined at that time to recommend any particular proxy model, these workshops provided an extensive review of the existing models, and established a number of criteria these models should meet.<sup>9</sup>

On February 7, 1997, AT&T and MCI submitted to the Joint Board a preliminary version of a new release of the Hatfield Model, Release 3.0, with accompanying documentation. The submission included data and illustrative results for five states: California, Colorado, New Jersey, Texas, and Washington.<sup>10</sup> HM 3.0 addressed the concerns raised by the Joint Board in its consideration of proxy cost models and the FCC in its consideration of modeling the forward looking economic cost of interconnection. It was responsive to the principles established and concerns raised about existing models in the *Local Competition Order*, the Joint Board's *Recommended Decision* and in Staff Papers and Workshops.

Later the same month, on February 28, AT&T and MCI submitted Hatfield Model Release 3.1 ("HM 3.1"). It incorporated certain minor modifications to HM 3.0; further, it contained data for 49 states plus the District of Columbia.

In April, 1997, the state members of the Joint Board issued several proxy cost modeling reports. Although these reports provided useful analyses of desired features within the models, they came to no clear final conclusion on the choice of a model.

On May 7, 1997, the FCC released its Order implementing the mandate for universal service contained in the Telecommunications Act of 1996.<sup>11</sup> In the *Universal Service Order*, it declined, on the basis of its then-current record, including the Report of the State Members of the Joint Board, to endorse a model. It indicated it would issue a Further Notice of Proposed Rulemaking ("FNPRM") detailing what it believed to be the appropriate requirements and guidelines that such a cost methodology should incorporate. The FNPRM was released on July 18, 1997.<sup>12</sup> In the *Further Notice*, the FCC provided detailed information about what the Commission believes are the appropriate properties to be incorporated into a proxy cost methodology. These include:

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<sup>8</sup> Released January, 9, 1997.

<sup>9</sup> *Recommended Decision*., paras. 273-277 and Appendix F.

<sup>10</sup> Results from Release 3.0 were submitted in three state proceedings: Kansas, Virginia, and Washington.

<sup>11</sup> Federal-State Joint Board on Universal Service, CC Docket No. 96-45, Report and Order, 12 FCC Rcd 8776 (1997) ("*Universal Service Order*"), as corrected by Federal-State Joint Board on Universal Service, *Errata*, CC Docket No. 96-45, FCC 97-157 (rel. June 4, 1997).

<sup>12</sup> Federal-State Joint Board on Universal Service, Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket Nos. 96-45, 97-160, Further Notice of Proposed Rulemaking, 12 FCC Rcd 18514 (1997) ("*Further Notice*"), at 18532, paras. 35-36.

- A sophisticated and precise method of locating customers;
- A choice of outside plant technologies and structures that reflects closely local cost conditions;
- Explicit modeling of host/remote relationships between end office switches; and
- Flexible assignments of expenses based either on lines or relative investments.

The FCC set up a series of weekly meetings, and Comment and Reply cycles, to address each of these and other related issues in greater depth. The FCC also indicated its intention to select a model for determining universal service support for nonrural carriers by the end of 1997.

On August 1, 1997, AT&T and MCI-WorldCom published HM 4.0. It incorporated the FCC's requirements as presented in the "*Universal Service Order*," and many of the requirements outlined in the FNPRM on cost modeling. It was an interim model in the sense that it anticipated the issuance of further FCC requirements and guidelines during the course of 1997. HM 4.0 provided a number of enhancements to HM 3.1, including, but not limited to, the several outlined in an ex parte submission to the Commission on June 5, 1997. In addition, HM 4.0 contained an improved and more accurate version of the demographic database from Taylor Nelson Sofres Telecoms ("TNS").

Throughout the middle part of 1997, the FCC conducted a series of workshops on model attributes and requirements, and supplemented its FNPRM with further public notices about the desired attributes of cost proxy models. Responding to this further guidance, AT&T and MCI-Worldcom submitted HM 5.0 to the FCC on December 11, 1997. HM 5.0 contained a number of enhancements and improvements over HM 4.0. The most dramatic of these were 1) the much more precise identification of customer locations based on the use of geocoded data, where available, and the assignment of non-geocoded locations to Census Blocks rather than the higher-level Census Block Groups ("CBGs"); and 2) the identification of outside plant serving areas with small clusters of customer locations, rather than the much less granular CBGs, thereby more accurately targeting outside plant deployment to actual customer locations.

A number of small but significant changes were subsequently made to the data and logic of HM 5.0, and incorporated into a revision referred to as HM 5.0a. HM 5.0a was filed with the FCC on January 28, 1998.

During 1998, the FCC continued to review cost proxy models sponsored by various parties, including the HAI Model, and, at the same time, continued to develop the internal FCC SM proxy cost model platform.

On October 22, 1998, the FCC adopted a Model “Platform” for use in determining the Universal Service Support for high cost areas.<sup>13</sup> The platform adopted the switching, interoffice and expense portions of HM 5.0a, as well as the road surrogating alternative that is now used in HM 5.3 for determining customer locations. But for customer clustering and outside plant (“loop”) design algorithms, it adopted the HCPM approach developed by the FCC’s Common Carrier Bureau Staff. It called this hybrid approach the Synthesis Model (“SM”). Therefore, the SM is an amalgam of the HAI Model and the FCC Staff’s HCPM. To a considerably lesser degree -- largely restricted to specifying the form of the inputs to the SM, and identification of road types along which customer may be located -- the Platform also utilizes a few aspects of the Benchmark Cost Proxy Model (“BCPM3”), a cost model sponsored by a number of LECs.

In 1999, HM 5.1 was developed to address a number of points that were addressed by the FCC in its *Model Platform Order*. HM 5.1 and all later versions of the model have been filed in selected states as needed, with customer location databases and distance files specific to those states.

HM 5.2 was developed to incorporate the FCC’s development of investment values for certain inputs that were release in the Commission’s *USF Inputs Order*.<sup>14</sup> It was subsequently modified to reflect investment values for certain network components as suggested by ILECs in submissions to the FCC, and to correct and improve several of its calculations, leading to Release HM 5.2a.

HM 5.3 was originally developed for use in estimating UNE costs for SBC in California. Its most fundamental change from earlier versions of the model was to include the calculation of costs associated with an additional set of narrowband, wideband, and broadband network elements, including voice grade and/or DS-0 dedicated circuits, ISDN, switched and non-switched DS-1 circuits, and DS-3 circuits. In addition, several of the model’s existing calculations were refined, and a number of the model’s inputs were updated to reflect new information and analyses. The model was subsequently filed in late 2003 in a current UNE cost proceeding for Verizon in California. There were a few additional enhancements and new features of the Verizon version of the model, most notably the addition of a UNE rate sheet specific to Verizon. Essentially the same version of the model is being filed in this proceeding, leaving out the Verizon California UNE rate sheet.

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<sup>13</sup> In the Matter of Federal-State Joint Board on Universal Service and Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket Nos. 96-45 and 97-160, Fifth Report and Order, 13 FCC Rcd 14915 (1998) (*Model Platform Order*).

<sup>14</sup> In the Matter of Federal-State Joint Board on Universal Service, CC Docket 96-45, and Forward Looking Mechanism for High Cost Support for Non-rural LECs, CC Docket 97-160, Tenth Report and Order, Released November 2, 1999 (*USF Inputs Order*)