339. GSF costs include the investment and expenses related to vehicles, land, buildings, and general purpose computers. Other expenses include: plant-specific operations expenses,[727] plant non-specific expenses,[728] corporate operations expenses,[729] and customer services expenses.[730] For purposes of this Order, costs associated with common support services (often called overhead expenses) refer to plant non-specific expenses, corporate operations expenses, and customer services expenses.

340. In the *Platform Order*, the Commission adopted HAI's algorithm for calculating expenses and GSF costs, as modified to provide some additional flexibility in calculating expenses offered by the BCPM sponsors.[731] With this added flexibility, the model allows the user to estimate expenses as either a per-line amount or as a percentage of investment. We noted that many of the questions regarding how best to calculate expenses would be resolved in the input selection phase of this proceeding.[732] In the *Inputs Further Notice*, we tentatively concluded that the input values for plant-specific operations expenses should be calculated as a percentage of investment,[733] and that the input values for common support services expenses should be estimated on a per-line basis.[734] In addition, we tentatively concluded that we should adopt input values that reflect the average expenses that will be incurred by non-rural carriers, rather than company-specific expense estimates.[735] As described below, we proposed methodologies for calculating these expenses. In addition, we proposed a methodology for estimating the GSF investment that should be allocated to the supported services.[736]

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[727] Plant specific operations expenses (that are not associated with GSF) include the cost of maintaining telecommunications plant and equipment. These network related expenses are not considered to be "joint and common costs." In ARMIS accounts, plant-specific operations expenses include GSF expenses.

[728] Plant non-specific expenses include the costs of engineering, network operations, and power expenses.

[729] Corporate operations expenses include the costs of administration, human resources, legal, and accounting expenses.

[730] Customer services expenses include the costs of marketing, billing, and directory listing expenses.

[731] *Platform Order*, 13 FCC Rcd at 21357, para. 81.

[732] *Platform Order*, 13 FCC Rcd at 21360, para. 87.

[733] *Inputs Further Notice* at para. 204.

[734] *Inputs Further Notice* at para. 213.

[735] *Inputs Further Notice* at paras. 198, 214.

[736] *Inputs Further Notice* at paras. 210-11.

B. Plant-Specific Operations Expenses

1. Background

341. Plant-specific operations expenses are the expense costs related to the maintenance of specific kinds of telecommunications plant.[737] In the *Inputs Further Notice,* we proposed a methodology for estimating expense-to-investment ratios consisting of four steps.[738] First, we obtained account-specific current cost to book cost (current-to-book) ratios for the related investment accounts, for the years ending 1995 and 1996, from Ameritech, Bell Atlantic, BellSouth, GTE, and SBC.[739] Second, we calculated two sets of composite current-

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[737] Plant-specific operations expenses correspond to the following ARMIS 43-03 report accounts:

6110 - Network Support Expense
6120 - General Support Expense
6210 - COE Switch
    6212 - COE Digital Electronic Switch only
6220 - Operator Systems
6230 - COE Transmission
    6231 - Radio Systems
    6232 - COE Circuit - DDS
    6232 - COE Circuit - Other than DDS
6310 - Information Origination/Termination
    6311 - Station Apparatus (only)
6341 - Large PBX
6351 - Public Telephone
6362 - Other Terminal Equipment
6411 - Poles
6421.1 - Aerial Cable - Metallic (Copper)
6421.2 - Aerial Cable - Fiber
6422.1 - Underground Cable - Metallic (Copper)
6422.2 - Underground Cable - Fiber
6423.1 - Buried Cable - Metallic (Copper)
6423.2 - Buried Cable - Fiber
6441 - Conduit Systems

[738] *Inputs Further Notice* at paras. 205-208.

[739] *Inputs Further Notice* at para. 205. For each account or sub-account, a current-to-book ratio is developed by first revaluing each type of equipment at its current replacement cost. The sum of these current costs is then divided by the total, embedded cost account balance. The resulting current-to-book ratio will be greater than one if current costs are rising relative to the historic costs and less than one if current costs are declining. The current-to-book ratios submitted by Ameritech, Bell Atlantic, BellSouth, GTE, and SBC are proprietary information subject to provisions in the *Protective Order* and therefore are not reproduced here. Although we would prefer to have data from more companies, the other ARMIS-filing carriers informed us that they either no

to-book ratios (year end 1995 and 1996) for each account based on composite current-to-book ratios for each of the five companies.[740] Third, we applied these composite current-to-book ratios to the year-end 1995 and 1996 investment account balances from the ARMIS 43-03 reports for all ARMIS-filing companies and averaged the 1995 and 1996 adjusted balances for each account.[741] Fourth, we calculated expense-to-investment ratios for each plant-specific operations expense account by dividing the total 1996 account balance for all ARMIS-filing companies by the current average investment calculated previously.[742] We tentatively concluded that these expense-to-investment ratios should be applied to the model-derived investment balances to obtain forward-looking plant-specific operations expense estimates.

342. In the *Inputs Further Notice*, we proposed adopting input values that reflect the average expenses that will be incurred by non-rural carriers, rather than a set of company-specific maintenance expense estimates, for several reasons.[743] We stated that using nationwide expense-to-investment ratios is consistent with the views of the states as reflected in the state Joint Board staff recommendations.[744] In addition, our proposed methodology requires some method of converting booked cost investment to current investment in order to estimate forward-looking plant specific operations expenses based on present day replacement cost, rather than historic, financial account balances. We noted that we have not been able to

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longer maintain this type of information, or never used current-to-book ratios for accounting purposes.

[740] *Inputs Further Notice* at para. 206. For each study area of the five holding companies that provided current-to-book ratios, we obtained year-end 1995 and 1996 investment balances from ARMIS for the plant accounts consistent with the aforementioned plant-specific expense accounts. Study area-specific current-to-book ratios for the two periods were multiplied by the 1995 and 1996 ARMIS investments in each account to derive the forward-looking, "current," year-end 1995 and 1996 investment levels by account and by study area. The ARMIS and current investments were then summed separately, by year and by account, for all study areas of the five holding companies. The resulting total current investment (by year and by account for the sum of all study areas) was then divided by the total ARMIS investment (by year and by account for the sum of all study areas) producing two sets of composite current-to-book ratios (year end 1995 and 1996).

[741] *Inputs Further Notice* at para. 207. To calculate the expense-to-investment ratios for the plant-specific operations expense accounts, we obtained total, year-end 1995 and 1996 investment account balances from the ARMIS 43-03 reports for all ARMIS-filing companies. To make these embedded account balances forward-looking, we next multiplied each investment account balance for each year by the current-to-book ratios for the same year developed earlier. The resulting year-end 1995 and year-end 1996 "current" account balances were then averaged by adding the two years together and dividing by two.

[742] *Inputs Further Notice* at para. 208. From the 1996 ARMIS 43-03 report, we obtained the 1996 balances for each plant-specific operations expense account for all ARMIS-filing companies. The expense account balances were divided by their respective average "current" investment to obtain expense-to-investment ratios.

[743] *Inputs Further Notice* at para. 198.

[744] *See* State Members' Report on the Use of Cost Proxy Models, March 26, 1997, at 22.

obtain current-cost-to-book-cost ratios for each non-rural ARMIS reporting firm, which would be necessary to calculate company or study area specific expense-to-investment ratios.[745] We tentatively concluded that averages are more consistent with the forward-looking nature of the high-cost model because less efficient firms are not rewarded if they have higher than average costs. In seeking comment on these proposals and tentative conclusions, we requested that parties advocating the use of company-specific values or other alternatives to nationwide or regional estimates identify the method and data readily available that could be used to estimate plant-specific expenses and indicate how their proposal is consistent with the goal of estimating forward-looking costs.[746]

343. In reaching our tentative conclusions, we recognized that parties have argued that maintenance expenses vary widely by geographic area and type of plant, while others have argued that plant-specific expenses are highly dependent on regional wage differences.[747] We explained that the synthesis model takes into account the variance in maintenance cost by type of plant installed because, as investment in a particular type of plant varies, the associated expense cost also varies.[748] We noted that we had been unable to verify significant regional differences among study areas or companies based solely on labor rate variations using the publicly available ARMIS expense account data for plant-specific maintenance costs. Nonetheless, we sought comment on the degree to which regional wage rate differentials exist and are significant, and asked parties to suggest independent data sources on variations of wage rates between regions and a methodology that permits such distinctions without resorting to self-reported information from companies.[749] In addition, we sought specific comment on a possible method of estimating regional wage differences by using indexes calculated by the President's Pay Agent.[750]

344. We also tentatively concluded that we should not adopt different expense estimates for small, medium, and large non-rural companies on a per-line basis.[751] We

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[745] *Inputs Further Notice* at para. 198.

[746] *Inputs Further Notice* at para. 198.

[747] *Inputs Further Notice* at para. 199.

[748] *Inputs Further Notice* at para. 199.

[749] *Inputs Further Notice* at para. 199.

[750] *Inputs Further Notice* at para. 200. These indexes are used to calculate locality pay differentials for federal employees. *See Report on Locality-based Comparability Payments for the General Schedule,* Annual Report of the President's Pay Agent, Appendix II, 1995.

[751] *Inputs Further Notice* at para. 201.

explained that we had tested whether significant differences in maintenance expenses per line could be discerned from segmenting companies into carriers serving less than 500,000 access lines, carriers serving between 500,000 and 5,000,000 access lines, and carriers serving over 5,000,000 access lines.[752] Because we found no significant differences in the expense factor per-line or per-investment estimates based on these criteria, we determined that economies of scale should not be a factor in estimating plant-specific expenses.[753]

345. Finally, we noted that we used data from 1995 and 1996 in the proposed methodology and tentatively concluded that it is appropriate to adjust these data to account for inflation and changes in productivity by obtaining revised 1997 current-to-book ratios from those companies providing data.[754] In addition, we tentatively concluded that we should use the most current ARMIS data available for the maintenance factor methodology. We sought comment on using the most current data available in the final computation of expense estimates.[755]

2. Discussion

346. Consistent with our tentative conclusions, we adopt input values that reflect the average expenses that will be incurred by non-rural carriers, rather than a set of company-specific maintenance expense estimates. We adopt our proposed four-step methodology for estimating expense-to-investment ratios using revised current-to-book ratios and 1997 and 1998 ARMIS data. We clarify that the ARMIS investment and expense balances used to calculate the expense-to-investment ratios in steps three and four should be based on the accounts for all *non-rural* ARMIS-filing companies. Although some rural companies file ARMIS reports, the mechanism we adopt today will be used, beginning January 1, 2000, to determine high-cost support only for non-rural carriers. We find, therefore, that it is appropriate to include only data from the non-rural ARMIS-filing companies in calculating these expense-to-investment ratios.[756]

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[752] *Inputs Further Notice* at para. 201.

[753] *Inputs Further Notice* at para. 201.

[754] *Inputs Further Notice* at para. 209.

[755] *Inputs Further Notice* at para. 209.

[756] Our proposed expense-to-investment ratios were based on ARMIS data for 91 study areas. The input values we adopt herein are based on ARMIS data for 80 non-rural study areas. We note that there generally is little or no difference between the expense ratios calculated using total ARMIS expense and investment accounts and non-rural ARMIS expense and investment. Where there are differences, the ratios based on non-rural data are higher for all categories except network support and general support.

347. Current Data. Parties commenting on whether we should update our methodology using more current ARMIS data agree that we should use the most currently available data.[757] We obtained account-specific current-to-book ratios for the related plant investment accounts, for the years ending 1997 and 1998, from Ameritech, Bell Atlantic, BellSouth, GTE, and SBC.[758] Accordingly, we adopt input values using these updated current-to-book ratios and 1997 and 1998 ARMIS data to calculate the expense-to-investment ratios that we use to obtain plant-specific operations expense estimates for use in the federal mechanism. These input values and the non-proprietary data used to calculate the expense-to-investment ratios are set forth in Appendix D.[759]

348. Nationwide Estimates. As discussed in this section, we adopt nationwide average values for estimating plant-specific operations expenses rather than company-specific values for several reasons. We reject the explicit or implicit assumption of most LEC commenters that the cost of maintaining incumbent LEC embedded plant is the best predictor of the forward-looking cost of maintaining the network investment predicted by the model. We find that, consistent with the *Universal Service Order's* criteria, forward-looking expenses should reflect the cost of maintaining the least-cost, most-efficient, and reasonable technology being deployed today, not the cost of maintaining the LECs' historic, embedded plant. We recognize that variability in historic expenses among companies is due to a variety of factors and does not simply reflect how efficient or inefficient a firm is in providing the supported services. We reject arguments of the LECs, however, that we should capture this variability by using company-specific data in the model. We find that using company-specific data for federal universal service support purposes would be administratively unmanageable and inappropriate. Moreover, we find that averages, rather than company-specific data, are better predictors of the forward-looking costs that should be supported by the federal high-cost mechanism. In addition, we find that using nationwide averages will reward efficient companies and provide the proper incentives to inefficient companies to become more efficient over time, and that this reward system will drive the national average toward the cost that the competitive firm could achieve. Accordingly, we affirm our tentative conclusion that we should adopt nationwide average input values for plant-specific operations expenses.

349. AT&T and MCI agree with our tentative conclusion that we should adopt input values that reflect the average expenses incurred by non-rural carriers, rather than company-

[757] *See, e.g.*, GTE *Inputs Further Notice* comments at 76; Sprint *Inputs Further Notice* comments at 59.

[758] Due to the manner in which SBC develops current-to-book ratios for each year (average beginning and end-of-year current investment divided by average beginning and end-of-year embedded investment) year-end 1998 current-to-book ratios are not available for SBC. Therefore, we applied year-end 1997 current-to-book ratios to both SBC's year-end 1997 and year-end 1998 investment in developing 1998 expense-to-investment ratios.

[759] *See* Appendix D at D-4.

specific expenses. They argue that the universal service support mechanism should be based on the costs that an efficient carrier *could* achieve, not on what any individual carriers *has* achieved.[760] In contrast, incumbent LEC commenters argue that we should use company-specific values.[761]

350. BellSouth, for example, contends that the approach suggested by AT&T and MCI conflicts with the third criterion for a cost proxy model, which states that "[t]he study or model, however, must be based upon an examination of the current cost of purchasing facilities and equipment . . .."[762] BellSouth argues that the "only logical starting point for estimating forward-looking expenses is the current actual expenses of the ILECs."[763] We agree that we should start with current actual expenses, as we do, in estimating forward-looking maintenance expenses. We do not agree with the inferences made by the incumbent LEC commenters, however, that our input values should more closely match their current maintenance expenses.

351. BellSouth's reliance on criterion three fails to quote the first part of that criterion, which states:

> Only long-run forward-looking economic cost may be included. The long-run period must be a period long enough that all costs may be treated as variable and avoidable. The costs must not be the embedded cost of facilities, functions, or elements.[764]

Thus, the model's forward-looking expense estimates should not reflect the cost of maintaining the incumbent LEC's embedded plant. The *Universal Service Order's* first criterion specifies that "[t]he technology assumed in the cost study or model must be the least-cost, most efficient, and reasonable technology for providing the supported services that is currently being deployed."[765] As we explained in the *Inputs Further Notice*, while the synthesis model uses existing incumbent LEC wire center locations in designing outside plant,

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[760] AT&T/MCI *Inputs Further Notice* comments at 45.

[761] *See, e.g.*, Bell Atlantic *Inputs Further Notice* comments at 20-21; BellSouth *Inputs Further Notice* comments at B-16, B-18; GTE *Inputs Further Notice* comments at 75-76.

[762] *See* BellSouth *Inputs Further Notice* reply comments at 17 (citing *Universal Service Order*, 12 FCC Rcd at 8913, para. 250, criterion three).

[763] BellSouth *Inputs Further Notice* reply comments at 17-18.

[764] *Universal Service Order*, 12 FCC Rcd at 8913, para. 250 (criterion three).

[765] *Universal Service Order*, 12 FCC Rcd at 8913, para. 250.

it does not necessarily reflect existing incumbent LEC loop plant.[766] Indeed, as the Commission stated in the *Platform Order*, "[e]xisting incumbent LEC plant is not likely to reflect forward-looking technology or design choices."[767] Thus, for example, the model may design outside plant with more fiber and DLCs and less copper cable than has been deployed historically in an incumbent LEC's network. We find that the forward-looking maintenance expenses also should reflect changes in technology.

352. GTE argues that expense-to-investment ratios should not be developed as national averages, because no national average can reflect the composition of each company's market demographics and plant.[768] GTE argues further that costs vary by geographic area and that this variability reflects operating difficulties due to terrain, remoteness, cost of labor, and other relevant factors.[769] GTE contends that "[u]sing national average operating expenses will either understate or overstate the forward-looking costs of providing universal service for each carrier, depending on the variability of each company to the average."[770] GTE claims that the use of the national average penalizes efficient companies that operate in high-cost areas.[771]

353. Similarly, Sprint contends that the use of nationwide estimated data does not accurately depict the realities of operating in Sprint's service territories.[772] Sprint claims that the national averages are far below Sprint's actual costs, because the Commission's methodology for estimating plant-specific expense inputs is heavily weighted toward the Bell companies' urban operating territories.[773] According to Sprint, the Bell companies have a much higher access line density than Sprint, and the expense data from such companies with a higher density of customers will result in expense levels that are much lower than the expense levels experienced by smaller carriers.[774] AT&T and MCI respond by showing that a

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[766] *Inputs Further Notice* at para. 50.

[767] *Platform Order*, 12 FCC Rcd at 21350, para. 66. "Instead, incumbent LECs' existing plant will tend to reflect choices made at a time when different technology options existed or when the relative cost of equipment to labor may have been different than it is today." *Id.*

[768] GTE *Inputs Further Notice* comments at 76.

[769] GTE *Inputs Further Notice* comments at 73.

[770] GTE *Inputs Further Notice* comments at 72.

[771] GTE *Inputs Further Notice* comments at 73.

[772] Sprint *Inputs Further Notice* comments at 51.

[773] Sprint *Inputs Further Notice* comments at 51.

[774] Sprint *Inputs Further Notice* comments at 51-52.

particular small carrier, serving a lower density area than Sprint, has plant-specific expenses that, on a per-line basis, are less than half of Sprint's expenses.[775] AT&T and MCI claim that "the most significant driver of cost differences between carriers in the ARMIS study area data is *efficiency*."[776] Like other LECs, SBC argues that the costs for LECs vary dramatically, based on various factors including size, operating territories, vendor contracts, relationships with other utility providers and the willingness to accept risk.[777] SBC asserts that "[t]hese differences are not in all instances attributable to inefficient operations."[778]

354. We agree with SBC that not all variations in costs among carriers are due to inefficiency. Although we believe that some cost differences are attributable to efficiency, we are not convinced by AT&T and MCI's example that Sprint is less efficient than the small carrier they identify. Sprint could have higher maintenance costs because it provides higher quality service. But we also are not convinced by Sprint's argument that maintenance expenses necessarily are inversely proportional to density. Sprint provides no evidence linking higher maintenance costs with lower density zones, and we can imagine situations where there are maintenance costs in densely populated urban areas that are not faced by carriers in low density areas. For example, busy streets may need to be closed and traffic re-routed, or work may need to be performed at night and workers compensated with overtime pay.

355. We cannot determine from the ARMIS data how much of the differences among companies are attributable to inefficiency and how much can be explained by regional differences or other factors. BellSouth's consultant concedes that there is nothing in the ARMIS expense account data that would enable the Commission to identify significant regional differences.[779] GTE concedes that it may be difficult to analyze some data because companies have not been required to maintain a sufficient level of detail in their publicly available financial records.[780] GTE's proposed solution for reflecting variations among states is simply to use company-specific data.[781] Indeed, none of the LECs propose a specific

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[775] AT&T/MCI *Inputs Further Notice* reply comments at 38 n.58.

[776] AT&T/MCI *Inputs Further Notice* reply comments at 38 n.58.

[777] SBC *Inputs Further Notice* comments at 4.

[778] SBC *Inputs Further Notice* comments at 4.

[779] BellSouth *Inputs Further Notice* comments, Attachment A at A-13. (comments of Georgetown Consulting Group, Inc.).

[780] GTE *Inputs Further Notice* comments at 73.

[781] GTE *Inputs Further Notice* comments at 73.

alternative to using self-reported information from companies.[782] For example, SBC argues we should use company-specific expenses provided pursuant to the *Protective Order* to develop company-specific costs, because these are the costs that will be incurred by the providers of universal service.[783]

356. While reliance on company-specific data may be appropriate in other contexts, we find that, for federal universal service support purposes, it would be administratively unmanageable and inappropriate. The incumbent LECs argue that virtually all model inputs should be company-specific and reflect their individual costs, typically by state or by study area.[784] As parties in this proceeding have noted, selecting inputs for use in the high-cost model is a complex process.[785] Selecting different values for each input for each of the fifty states, the District of Columbia, and Puerto Rico, or for each of the 94 non-rural study areas, would increase the Commission's administrative burden significantly.[786] Unless we simply accept the data the companies provide us at face value, we would have to engage in a lengthy process of verifying the reasonableness of each company's data. For example, in a typical tariff investigation or state rate case, regulators examine company data for one-time high or low costs, pro forma adjustments, and other exceptions and direct carriers to adjust their rates accordingly. Scrutinizing company-specific data to identify such anomalies and to make the appropriate adjustments to the company-proposed input values would be exceedingly time consuming and complicated given the number of inputs to the model.[787] We recognize that such anomalies invariably exist in the ARMIS data, but we find that, by using averages, high and low values will cancel each other out.

357. Where possible, we have tried to account for variations in cost by objective

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[782] In its reply comments, Sprint argues that inputs should vary by company size and region, but does not provide a specific methodology for doing so. *See* Sprint *Inputs Further Notice* reply comments at 3-4.

[783] SBC *Inputs Further Notice* comments at 14-15.

[784] *See, e.g.,* Bell Atlantic *Inputs Further Notice* comments at 20-21; BellSouth *Inputs Further Notice* comments, Attachment B at B-16, B-18; GTE *Inputs Further Notice* comments at 75-76.

[785] *See, e.g.,* AT&T/MCI *Inputs Further Notice* reply comments at 3-7.

[786] There are 94 non-rural study areas. As noted above, the expense-to-investment ratios were calculated using ARMIS data for 80 non-rural study areas. There are more non-rural study areas than there are non-rural study areas for which we have ARMIS data because some non-rural companies do not file ARMIS data (Roseville, North State, and Contel of Minnesota) and some ARMIS-filing companies file consolidated data for combined study areas (Puerto Rico, some GTE companies). *See supra* note 756.

[787] As discussed below, when the Commission has had the opportunity to scrutinize carriers' company-specific costs, as with the local number portability tariffs, we use company-specific input values in the model. *See infra* at para. 408.

means. As we stated in the *Inputs Further Notice*, we believe that expenses vary by the type of plant installed.[788] The model takes this variance into account because, as investment in a particular type of plant varies, the associated expense cost also varies. The model reflects differences in structure costs by using different values for the type of plant, the density zone, and soil conditions.

358. As discussed above, we cannot determine from the ARMIS data how much of the differences among companies are attributable to inefficiency and how much can be explained by regional differences or other factors. To the extent that some cost differences are attributable to inefficiency, using nationwide averages will reward efficient companies and provide the proper incentives to inefficient companies to become more efficient over time. We find that it is reasonable to use nationwide input values for maintenance expenses because they provide an objective measure of forward-looking expenses. In addition, we find that using nationwide averages in consistent with our forward-looking economic cost methodology, which is designed to send the correct signals for entry, investment, and innovation.

359. Bell Atlantic contends that using nationwide averages for plant specific expenses, rather than ARMIS data disaggregated to the study area level, defeats the purpose of a proxy model because it averages high-cost states with low-cost states.[789] Bell Atlantic argues that we should use the most specific data inputs that are available, whether region-wide, company specific, or study-area specific.[790] Conceding that data are not always available at fine levels of disaggregation, Bell Atlantic contends there is no reason to throw out data that more accurately identify the costs in each area.[791] Bell Atlantic argues that, even if the Commission does not have current-to-book ratios for all of the ARMIS study areas, it could use average current-to-book ratios and apply them to company-specific ARMIS data.[792]

360. Contrary to Bell Atlantic's contention, we do not find that using nationwide average input values in the federal high-cost mechanism is inconsistent with the purpose of using a cost model. In addition to the administrative difficulties outlined above, we find that nationwide values are generally more appropriate than company-specific input values for use in the federal high-cost model. In using the high-cost model to estimate costs, we are trying to establish a national benchmark for purposes of determining support amounts. The model assumes, for example, that all customers will receive a certain quality of service whether or

[788] *Inputs Further Notice* at para. 199.

[789] Bell Atlantic *Inputs Further Notice* comments at 20.

[790] Bell Atlantic *Inputs Further Notice* comments at 20.

[791] Bell Atlantic *Inputs Further Notice* comments at 20.

[792] Bell Atlantic *Inputs Further Notice* comments at 20.

not carriers actually are providing that quality of service.[793] Because differences in service quality can cause different maintenance expense levels, by assuming a consistent nationwide quality of service, we control for variations in company-specific maintenance expenses due to variations in quality of service. Clearly, we are not attempting to identify any particular company's cost of providing the supported services. We are, as AT&T and MCI suggest,[794] estimating the costs an efficient provider would incur in providing the supported services. We are not attempting to replicate past expenses, but to predict what support amounts will be sufficient in the future. Because high-cost support is portable, a competitive eligible telecommunications carrier, rather than the incumbent LEC, may be the recipient of the support. We find that using nationwide averages is a better predictor of the forward-looking costs that should be supported by the federal high-cost mechanism than any particular company's costs.[795]

361. Estimating regional wage differences. We do not adjust our nationwide input values for plant-specific operations expenses to reflect regional wage differences. Most LEC commenters advocate the use of company-specific data to reflect variations in wage rates.[796] GTE, for example, claims that regional wage rate differentials are reflected in the company-specific data available from ARMIS.[797] GTE complains that our proposed input values suggest there is no difference in labor and benefits costs between a company operating in Los Angeles and one operating in Iowa.[798] As discussed above, the publicly available ARMIS expense account data for plant-specific maintenance expenses do not provide enough detail to permit us to verify significant regional differences among study areas or companies based solely on labor rate variations.[799] For the reasons discussed above, we find that we should not use company-specific ARMIS data to estimate these expenses, but instead use input values

[793] In contrast, if we were determining the rates a carrier could charge for a particular service, the quality of service the carrier actually was providing could be a relevant factor.

[794] *See supra* para. 349; AT&T/MCI *Inputs Further Notice* comments at 45.

[795] As noted above, the Commission has not considered what type of input values, company-specific or nationwide, nor what specific input values, would be appropriate for any other purposes and caution parties from making any claims in other proceedings based upon the input values we adopt in this Order. *See supra* para. 32.

[796] *See, e.g.,* Bell Atlantic *Inputs Further Notice* comments at 20; GTE *Inputs Further Notice* comments at 74-75; Sprint *Inputs Further Notice* comments at 54.

[797] GTE *Inputs Further Notice* comments at 74-75.

[798] GTE *Inputs Further Notice* comments at 74-75.

[799] *See supra* para. 355.

that reflect nationwide averages.[800]

362. Although they would prefer that we use company-specific data, some LEC commenters suggest that the wage differential indexes used by the President's Pay Agent, on which we sought comment, would be an appropriate method of disaggregating wage-related ARMIS expense data.[801] GTE, on the other hand, contends that these indexes are not relevant to the telecommunications industry, because they are designed for a specific labor sector, that is, federal employees.[802] GTE claims that there are numerous publicly available sources of labor statistics and that, if we adopt an index factor, it should be specific to the telecommunications industry.[803]

363. We agree with GTE that, if we were to use an index to adjust our input values for regional wage differences, it would be preferable to use an index specific to the telecommunications industry. We looked at other publicly available sources of labor statistics, however, and were unable to find a data source that could be adapted easily for making meaningful adjustments to the model input values for regional wage differences. Specifically, we looked at U.S. Department of Labor, Bureau of Labor Statistics (BLS) information on wage rate differentials for communications workers comparing different regions of the country.[804] The Employment Cost Indexes calculated by BLS identify changes in compensation costs for communications workers as compared to other industry and occupational groups. In a number of the indexes, communications is not broken out separately, but is included with other service-producing industries: transportation, communication, and public utilities; wholesale and retail trade; insurance, and real estate; and service industries. In making regional comparisons, the Employment Cost Indexes divide the nation into four regions: northeast, south, midwest, and west. There also are separate indexes comparing metropolitan areas to other areas.

364. We find that the regions used in the BLS data are too large to make any

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[800] *See supra* para. 356.

[801] Bell Atlantic *Inputs Further Notice* comments at 21; Sprint *Inputs Further Notice* comments at 54.

[802] GTE *Inputs Further Notice* comments at 75.

[803] GTE *Inputs Further Notice* comments at 75.

[804] *See* Bureau of Labor Statistics, Employment Cost Trends, Employment Cost Index, June 1999, at http://www.bls.gov/news.releases/eci.toc.htm. In particular, we looked at the following tables: Table 4, Compensation (not seasonally adjusted), Employment Cost Index for total compensation, private industry workers, by bargaining status, region and area; Table 5, Wages and Salaries (not seasonally adjusted), Employment Cost Index for wages and salaries only, civilian, and state and local government workers, by industry and occupational group; and Table 7, Wages and Salaries (not seasonally adjusted) Employment Cost Index for wages and salaries only, private industry workers, by bargaining status, regional and area.

significant improvement over our use of nationwide average numbers. For example, Wyoming is in the same region as California, but we have no reason to believe that wages in those two states are more comparable than wages rates in California and Iowa. That is, there is no simple way to use the BLS data to make the type of regional wage adjustments suggested by GTE. We note that no party has suggested a specific data source or methodology that would be useful in making such adjustments. Accordingly, we decline to adopt a method for adjusting our nationwide input values for plant-specific operations expenses to reflect regional wage differences.

365. Methodology. As discussed in this section, we adopt our proposed methodology for calculating expense-to-investment ratios to estimate plant-specific operations expenses. We reject arguments of some LEC commenters that this methodology inappropriately reduces these expense estimates.

366. Several LEC commenters generally support our methodology for calculating expense-to-investment ratios to estimate plant-specific operations expenses, although, as discussed above, only if we use company-specific input values. For example, GTE agrees with our tentative conclusion that input values for each plant-specific operations expense account can be calculated as the ratio of booked expense to current investment, but only if this calculation is performed on a company-specific basis.[805] BellSouth states that "[t]he methodology proposed by the Commission for plant-specific expenses is very similar to the methodology employed by BellSouth."[806]

367. Other LEC commenters object to our use of current-to-book ratios to convert historic account values to current cost. Although their arguments differ somewhat, they essentially claim that the effect of our methodology is to reduce forward-looking maintenance expenses and that this is inappropriate because the input values are lower than their current maintenance expenses.[807] AT&T and MCI counter that, if there is any problem with our maintenance expense ratios, it is that they reflect the servicing of too much embedded plant, which has higher maintenance costs, and too little forward-looking plant, which has lower maintenance costs.[808]

368. US West asserts that, while in theory it is correct to adjust expense-to-investment ratios using current-to-book ratios, in practice there is a problem because the

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[805] GTE *Inputs Further Notice* comments at 72, 75-76.

[806] BellSouth *Inputs Further Notice* comments, Attachment B at B-16.

[807] *See* SBC *Inputs Further Notice* comments at 14-18; Sprint *Inputs Further Notice* comments at 55-59; US West *Inputs Further Notice* comments at 21-26.

[808] AT&T/MCI *Inputs Further Notice* reply comments at 38.

current-to-book ratio is based on reproduction costs and the model estimates replacement costs.[809] US West defines reproduction cost as the cost of reproducing the existing plant using today's prices and replacement cost as the cost of replacing the existing plant with equipment that harnesses new technologies and is priced at today's prices.[810] US West claims that our methodology actually increases the mismatch between historic and forward-looking investment levels because the reproduction costs are not the same as the replacement costs.[811] We agree that reproduction costs are not the same as replacement costs because the mix of equipment and technology will differ, but we disagree with US West's characterization of this as a mismatch.

369. US West estimates that applying current-to-to book ratios to existing investment would generate reproduction costs that are 141 percent higher than historic costs.[812] US West claims that, in contrast, forward-looking models generally show that the cost of replacing those facilities would be slightly less than historic costs, if new technologies were deployed. US West's claim that our methodology results in a mismatch because of these cost differences, however, is wrong. Rather, the differences between reproduction costs and replacement costs merely show that the mix of technologies has changed. The hypothetical example US West uses to illustrate its argument fails to account for changes in technology. The following hypothetical example illustrates how changes in the mix of technology will change maintenance expenses.[813] If historic investment on a company's books consists of 100 miles of copper plant, at a cost of $10 per mile, and 10 miles of fiber plant, at a cost of $1 per mile, then the historic cost is $1010. If current maintenance costs are $10 for the copper plant and $0.10 for the fiber plant, the total maintenance expense is $10.10. If the price of copper increases to $15 per mile and the price of fiber decreases to 80 cents per mile, then the reproduction costs would increase to $1508. If the forward-looking model designs a network with 60 miles of copper and 50 miles of fiber, the resulting replacement cost is $940.[814] Using our methodology, we use the current-to-book ratios of 1.5 ($15/$10) and .8

[809] US West *Inputs Further Notice* comments at 23-24.

[810] US West *Inputs Further Notice* comments at 23-24.

[811] US West *Inputs Further Notice* comments at 23-24.

[812] US West *Inputs Further Notice* comments at 24-25. US West indicates that it used the Telephone Plant Index (TPI) to derive the 141 percent figure. US West implies, therefore, that the TPI is a reproduction cost index. This raises questions with respect to how a reproduction index deals with old technology that cannot be purchased today at any price. Without detailed knowledge about the TPI, we cannot say whether it reflects only reproduction costs or may also reflect replacement costs when new technology has replaced old technology.

[813] The values used in this example are hypothetical and do not represent actual input values.

[814] Our hypothetical example reflects US West's contention that reproduction costs are significantly higher than replacement costs and that replacement costs are only slightly lower than historic costs.

(80 cents divided by $1) to revalue the copper and fiber investment, respectively, at current prices, and the resulting maintenance expense for the forward-looking plant would be $6.58 rather than $10.10.[815] This does not result in a mismatch. In our hypothetical example, the maintenance costs for fiber were substantially less on a per-mile basis than they were for copper. Thus, we would expect the forward-looking plant with considerably more fiber and less copper to have lower maintenance costs than the current plant, which has more copper. Because the mix of plant changes, the Commission should not, as US West suggests, simply adjust book investment to current dollars to derive maintenance expenses for the forward-looking plant estimated by the model.

370. Sprint argues that we should simply divide the current year's actual expense for each account by the average plant balance associated with that expense.[816] Sprint claims that, when this ratio is applied to the investment calculated by the model, forward-looking expense reductions occur in two ways: (1) the investment base is lower due to the assumed economies of scale in reconstructing the forward-looking network all at one time; and (2) greater use of fiber in the forward-looking network reduces maintenance costs because less maintenance is required of fiber than of the copper in embedded networks.[817] Sprint claims that reducing maintenance for a current-to-book ratio as well as for technological factors constitutes a "double-dip" in maintenance expense reduction.[818]

371. Sprint's claim that our methodology constitutes a "double dip" in reducing maintenance expenses is misleading because the effect of using current-to-book ratios depends upon whether current costs have risen or fallen relative to historic costs. Current-to-book ratios are used to restate a company's historic investment account balances, which reflect investment decisions made over many years, in present day replacement costs. Thus, if current costs are higher than historic costs for a particular investment account, the current-to-book ratio will be greater than one, and the expense-to-investment ratio for that account will decrease when the investment (the denominator in the ratio) is adjusted to current replacement

[815] To revalue the copper investment, we multiply $1000 by 1.5 (=$1500); then to calculate the expense-to-investment ratio, we divide current maintenance expenses for copper by the adjusted copper investment ($10/$1500 = .0067). Similarly, to revalue the fiber investment, we multiply $10 by .8(=$8); then to calculate the expense-to-investment ratio, we divide current maintenance expenses for fiber by the adjusted fiber investment ($.10/8=.0125). Finally, we apply these adjusted expense-to-investment ratios to the forward-looking plant to derive the forward-looking maintenance expenses: $900 x .0067 ($6.03) + $40 x .0125(.50) = $6.58.

[816] Sprint *Inputs Further Notice* comments at 55.

[817] Sprint *Inputs Further Notice* comments at 55.

[818] Sprint *Inputs Further Notice* comments at 55.

costs.[819] Sprint calls this double dipping because copper costs have risen and the model uses less copper plant than that which is reflected on Sprint's books. If current costs are lower than historic cost, however, the current-to-book ratio will be less than one and the adjusted expense-to-investment ratio for that account will increase when the investment (the denominator in the ratio) is adjusted to current replacement costs. Fiber cable and digital switching costs, for example, have fallen relative to historic costs. Sprint essentially is arguing that our methodology is wrong because it understates Sprint's historical costs. The input values we select are not intended to replicate a particular company's historic costs, for the reasons discussed above.[820]

372. SBC disputes our assumption that the model takes into account variations in the type of plant installed because, as investment in a particular type of plant varies, so do the associated expense costs.[821] SBC argues that expenses do not vary simply because investment varies.[822] Nonetheless, SBC believes that developing a ratio of expense to investment and applying it to forward-looking investments is a reasonable basis for identifying forward-looking plant specific expenses.[823] SBC complains that our methodology is inconsistent, however, because it has defined two completely different sets of forward-looking investments: one based on historical ARMIS investments adjusted to current amounts; and another derived on a bottom-up basis employing the cost model.[824] Until we reconcile these "inconsistencies," SBC recommends that we use unadjusted historical investment amounts in developing plant specific expense factors, because they are closer to SBC's historical plant specific expenses.[825]

373. Although they characterize the issue somewhat differently, US West, Sprint, and SBC essentially argue that our methodology is wrong because it understates their historical costs. AT&T and MCI counter that a forward-looking network often will result in lower costs than an embedded network and that the trend in the industry has been to develop

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[819] For example, if a pole cost $200 to install in 1980, and $400 today, the current-to-book ratio is $400/$200 = 2.0. If the maintenance expense associated with the pole is $20, the expense-to-investment ratio on the books is $20/$200 = .10; and the expense-to-investment ratio adjusted by the current-to-book ratio is $20/$400 = .05.

[820] *See supra* para. 351.

[821] SBC *Inputs Further Notice* comments at 15.

[822] SBC *Inputs Further Notice* comments at 15.

[823] SBC *Inputs Further Notice* comments at 15.

[824] SBC *Inputs Further Notice* comments at 16.

[825] SBC *Inputs Further Notice* comments at 16-17, Attachment A (comparing Southwestern Bell/Texas costs of 5.96 percent of related investments to the Commission's proposed 3.08 percent of related investment).

equipment and practices to minimize maintenance expense.[826] AT&T and MCI claim that, if there is any problem with our maintenance expense ratios, it is that they reflect the servicing of too much embedded plant, which has higher maintenance costs, and too little forward-looking plant, which has lower maintenance costs.[827] AT&T and MCI further claim that, if our analysis had been based exclusively on financial information that reflected equipment consistent with the most-efficient forward-looking practices, the maintenance expenses would have been lower.[828]

374. None of the commenters provide a compelling reason why we should not use current-to-book ratios to adjust historic investment to current costs. SBC in fact suggests that the Commission consider using the Telephone Plant Index (TPI) in future years to convert expense estimates to current values.[829] SBC appears to be confusing the effect of measuring inputs in current dollars, which it recognizes is reasonable, and the end result of the calculation, which includes the impact of measuring all inputs in current dollars, changes in the mix of inputs, the impact of least-cost optimal design used by the model, and the model's engineering criteria. The relationship between maintenance costs and investment in the Commission's methodology is related to all of these factors.

375. Sprint also claims that our methodology understates maintenance costs, because it assumes new plant and the average maintenance rate will be higher than the rate in an asset's first year.[830] AT&T and MCI dispute Sprint's claim that maintenance costs per unit of plant increase over time.[831] Sprint provides an example which purports to show that an asset with a ten year life, a ten percent maintenance fee in the first year, and annual costs increasing annually at three percent, would result in an average maintenance rate of 11.55 percent.[832] Sprint's example, however, does not consistently apply our methodology. Sprint's example fails to apply the current-to-book ratio to the total and average plant in service estimates used in the example. When the current-to-book ratio is applied to the total and average plant in service estimates, the resulting maintenance rate is ten percent for all years.

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[826] AT&T/MCI *Inputs Further Notice* reply comments at 38.

[827] AT&T/MCI *Inputs Further Notice* reply comments at 38.

[828] AT&T/MCI *Inputs Further Notice* reply comments at 38.

[829] SBC *Inputs Further Notice* comments at 15.

[830] Sprint *Inputs Further Notice* comments at 55.

[831] AT&T/MCI *Inputs Further Notice* reply comments at 38.

[832] Sprint *Inputs Further Notice* comments at 55-57, Attachment 10a.

376. BellSouth argues that the investment calculated by the model is unrealistically low because sharing assigned to the telephone company is unrealistically low and fill factors are unrealistically high.[833] BellSouth argues that, because it has shared in cost of trenching, this does not mean the maintenance cost for buried cable would be less, and in fact, the costs may be higher.[834] BellSouth apparently is confused about the Commission's methodology, because the sharing percentages apply only to the costs of structure, not the costs of the cable.

C. Common Support Services Expenses

1. Background

377. Common support services expenses include corporate operations expenses, customer service expenses, and plant non-specific expenses. Corporate operations expenses are those costs associated with general administrative, executive planning, human resources, legal, and accounting expenses for total company operations. Customer services expenses include marketing, billing, operator services, directory listing, and directory assistance costs.[835] Plant non-specific expenses are common network operations and maintenance types of

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[833] BellSouth *Inputs Further Notice* comments, Attachment B at B-19.

[834] BellSouth *Inputs Further Notice* comments, Attachment B at B-16.

[835] Corporate operations and customer service expenses include the following ARMIS accounts and their subaccounts:

6610 - Marketing Total
- 6611 - Product Management
- 6612 - Sales
- 6613 - Product Advertising

6620 - Service Expense Total
- 6621 - Call Completion (Operator Service Expense)
- 6622 - Number Services (Directory Publishing Expense)
- 6623 - Customer Services

6710 - Executive and Planning Total
- 6711 - Executive
- 6712 - Planning

6720 - General and Administrative
- 6721 - Accounting and Finance
- 6722 - External Relations
- 6723 - Human Resources
- 6724 - Information Management
- 6725 - Legal
- 6726 - Procurement
- 6727 - Research and Development
- 6728 - Other General and Administrative

expenses, including engineering, network operations, power, and testing expenses, that are considered general or administrative overhead to plant operations.[836]

378. In the *Inputs Further Notice*, we proposed a methodology using regression analysis to estimate common support services expenses on a per-line basis. We noted that, unlike plant-specific expenses, common support services expenses are costs that cannot readily be associated with any particular maintenance expense or investment account.[837] In the regression methodology, we used publicly available 1996 ARMIS expense data[838] and minutes of use information from NECA,[839] by study area, to estimate the portion of these company-wide expenses that should be supported by the federal high-cost mechanism.[840] Specifically, we used the average of the estimates from two specifications that estimated total expenses per line as a function of the percentage of switched lines, the percentage of special lines, and toll minutes per line, either in combination (Specification 1) or separated between intrastate and interstate toll minutes (Specification 2).[841] The specifications were designed to separate the portion of expenses attributable to special access lines and toll usage, which are not supported by the federal high-cost mechanism, from the portion of expenses attributable to switched lines and local usage, which are supported.

379. As with plant-specific operations expenses, we tentatively concluded that input values for corporate operations, customer service, and plant non-specific expenses should be estimated on a nationwide basis, rather than a more disaggregated basis.[842] In reaching this

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[836] Plant non-specific expenses include the following ARMIS expense accounts:

6510 - Other Property Plant and Equipment Expense
6530 - Network Operations

[837] *Inputs Further Notice* at para. 213.

[838] Data was taken from 1996 ARMIS 43-01, Subject to Separations (Column F) for Accounts 6610, 6620, 6710 and 6720. Data was taken from 1996 ARMIS 43-03, Subject to Separations (Column M) for Accounts 6510 and 6530. Line counts were taken from 1996 ARMIS 43-08, Table III, Total Switched Lines (Column DJ) and Total Access Lines (Column DM).

[839] Dial Equipment Minutes of Use (DEMs) for 1996 were taken from NECA and are available on the Commission's Web site at http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/neca.html.

[840] *Inputs Further Notice* at para. 217.

[841] *See Inputs Further Notice* at para. 218-19. Specification 1 used the following regression equation: Expense/Total Lines = β_1 (Switched Lines/Total Lines)+ β_2 (Special Lines/Total Lines)+ β_3 (Toll Minutes/Total Lines). Specification 2 used the following equation: Expense/Total Lines = β_1 (Switched Lines/Total Lines)+ β_2 (Special Lines/Total Lines)+ β_3 (State Toll Minutes/Total Lines)+ β_4 (Interstate Toll Minutes/Total Lines).

[842] *See Inputs Further Notice* at para. 214.

tentative conclusion, we recognized that parties have argued that these types of expenses may vary as a result of company-specific plant configurations, geographic and labor demographic variables, one-time exogenous costs, and non-recurring adjustments such as re-engineering expenses.[843] We observed that we had not been able to distinguish significant differences in regional wage differentials for administrative services based solely on ARMIS expense data for these accounts.[844] Moreover, costs associated with corporate overhead and customer service accounts are not directly linked to a specific company's investment levels. We tentatively concluded that these types of administrative and service expenses are less dependent on carrier physical plant or geographic differentials than on factors that also correlate to company size (number of lines) and demand (minutes of use).[845]

380. After estimating common support services expenses using the regression methodology, we made certain adjustments to remove additional portions of those expenses attributable to services that are not supported by the federal universal service support mechanism. The expenses we removed were associated with services that could be identified and estimated from ARMIS expense data.[846] We tentatively concluded that 95.6 percent of marketing expenses should be attributed to non-supported services, based on an Economics and Technology, Inc. (ETI) analysis.[847] In addition, we adjusted the estimates for non-supported service costs related to coin operations and collection, published directory, access billing, interexchange carrier office operation, and service order processing.[848] We noted that non-recurring expenses for corporate operations can be significant and that our estimates should be adjusted to account for these one-time charges.[849] We explained, however, that we had been unable to find an objective public data source or discern a systematic method for excluding these costs from the ARMIS expense data used in the regression methodology.[850] We sought comment on how to identify, estimate, and remove these one-time non-recurring expenses.[851]

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[843] *Inputs Further Notice* at para. 215.

[844] *Inputs Further Notice* at para. 215.

[845] *Inputs Further Notice* at para. 215.

[846] *Inputs Further Notice* at para. 223.

[847] *Inputs Further Notice* at para. 224.

[848] *Inputs Further Notice* at para. 225.

[849] *Inputs Further Notice* at para. 220-222.

[850] *Inputs Further Notice* at para. 221.

[851] *Inputs Further Notice* at para. 222.

381. We also adjusted our estimates for common support services expenses by converting the values, which were based on 1996 ARMIS data, to 1999 values.[852] Specifically, we reduced the estimated expenses by a 6.0 percent productivity factor for each year (1997 and 1998) and added an inflation factor based on the fixed weighted Gross Domestic Product Price Index (GDP-PI) for 1997 (2.1120 percent) and for 1998 (2.1429 percent).[853] That is, we proposed a net reduction of 3.888 percent for 1997 and 3.8571 percent for 1998, and sought comment on this method for converting expenses to 1999 values.[854]

2. Discussion

382. Consistent with our tentative conclusions, we adopt input values that estimate the average common support services expenses that will be incurred by non-rural carriers on a per-line basis, rather than a set of company-specific common support services expenses.[855] We affirm our tentative conclusion that input values for corporate operations, customer service, and plant non-specific expenses should be estimated on a nationwide basis, rather than a more disaggregated basis. As noted above, we find that for universal service purposes nationwide averages are more appropriate than company-specific values.[856] We conclude that we should use Specification 1 of our proposed regression methodology to estimate expenses for ARMIS accounts 6510 (Other Property, Plant, and Equipment); 6530 (Network Operations); 6620 (Service Expense/Customer Operations); and 6700 (Executive, Planning,

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[852] *Inputs Further Notice* at para. 226.

[853] *Inputs Further Notice* at para. 226.

[854] *Inputs Further Notice* at para. 226.

[855]

Aggregate ARMIS Accounts	Expense Input Values
6510 Other Property, Plant, and Equipment	$ (0.05)
6530 Network Operations	1.48
6610 Marketing	0.09
6620 Service Expense/Customer Operations	3.62
6700 Executive, Planning, General, and Administrative	2.18
Total Common Support Services Expenses Per Line, Per Month	$ 7.32

Rather than using the $7.32 directly as an input value, the model uses this amount, annualized and adjusted for uncollectibles, or $92.46316, which appears in cell C33 of the per line tab of the wire center expense module.

[856] *See supra* para. 348.

General, and Administrative).[857] As discussed below, we use an alternative methodology to estimate expenses for ARMIS account 6610 (Marketing).[858] We conclude that we should use 1998 ARMIS data in both methodologies, and an estimate of 1998 Dial Equipment Minutes of Use (DEMs) in the regression equation, to calculate these input values. We clarify that the ARMIS data we use to calculate these estimates are based on ARMIS accounts for all *non-rural* ARMIS-filing companies. We find that it is appropriate to include only data from the non-rural ARMIS-filing companies in calculating the expense per line for common support services expenses.[859]

383. Current Data and Use of Productivity Factor. The input values we adopt in this Order are explained more fully in Appendix D, which contains a summary of the per-line, per-month input values for plant non-specific expenses, corporate operations expenses, and customer services expenses, including regression results, calculations, and certain adjustments made to the data based on the methodologies described below.[860] Because we used 1996 ARMIS data in our regression methodology to estimate our proposed input values for common support services expenses, we proposed a method of converting those estimates to 1999 values.[861] Specifically, we proposed using a productivity factor of 6.0 percent for the years 1997 and 1998 to reduce the estimated input values.[862] We further proposed adjusting the expense data for those years with an inflation factor based on the Gross Domestic Product Price Index (GDP-PI) in order to bring the input values up to current expenditure levels.[863]

384. AT&T and MCI claim that the 6.0 productivity factor is too low,[864] while most

[857] Specifically, we adopt estimates using results solely from the Specification 1 regression equation: Expense/Total Lines = $\beta 1$ (Switched Lines/Total Lines) + $\beta 2$ (Special Lines/Total Lines) + $\beta 3$ (Toll Minutes/Total Lines) rather than an average of results from two model specifications, as proposed. *See Inputs Further Notice* at para. 218.

[858] *See infra* paras. 403-407.

[859] As noted above, although some rural companies file ARMIS reports, the mechanism we adopt today will be used, beginning January 1, 2000, to determine high-cost support for non-rural carriers. *See supra* para. 346.

[860] *See* Appendix D at D-5.

[861] *Inputs Further Notice* at para. 226

[862] *Inputs Further Notice* at para. 226

[863] *Inputs Further Notice* at para. 226

[864] *See* AT&T/MCI *Inputs Further Notice* comments at 46-47.

LEC commenters contend that it is too high.[865] Sprint argues that expenses should not be adjusted for a productivity or an inflation factor and that we should use 1998 data.[866] GTE argues that no productivity adjustments are necessary, if we use current, company-specific ARMIS data to develop input values.[867] Although we generally decline to adopt company-specific input values for common support services expenses, we agree that using the most currently available ARMIS data (1998) obviates the need to adjust our estimates for either productivity gains or an inflation factor at this time. We believe, however, that there should be an incentive for increased productive efficiency among carriers receiving high-cost universal service support. Accordingly, we believe that a reasonable productivity measure or some other type of efficiency incentive to decrease costs associated with common support services expenses should be incorporated into the universal service high-cost support mechanism in the future. We intend to address this issue in the proceeding on the future of the model.

385. The input values we adopt in this Order are estimates of the portion of company-wide expenses that should be supported by the federal high-cost mechanism.[868] We derive the estimates using standard economic analysis and forecasting methods. The analysis relies on publicly available 1998 ARMIS expense data and the most current minutes of use information from NECA. This data is organized by study area. The estimate of 1998 DEMs is based on a calculated growth rate of 1997 to 1996 DEMs reported by NECA.[869] As a result of deleting rural ARMIS-filing companies and including company study area changes since 1996, pooling of the 1998 data sets provides expense, minutes of use, and line count data for 80 study areas.[870] This is in comparison to the 91 study areas resulting from pooling the 1996

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[865] *See e.g.*, Aliant *Inputs Further Notice* comments at 2-3; Bell Atlantic *Inputs Further Notice* comments at 22; BellSouth *Inputs Further Notice* comments at B-21-B-23; USTA *Inputs Further Notice* comments at 2.

[866] Sprint *Inputs Further Notice* comments at 60, 68.

[867] GTE *Inputs Further Notice* comments at 88.

[868] Data were taken from 1998 ARMIS 43-03, Total Regulated (Column I) for Accounts 6610, 6620, 6710, 6720, 6510, and 6530. Line counts were taken from 1998 ARMIS 43-08, Table III, Total Switched Lines (Column DJ) and Total Access Lines (Column DM).

[869] Dial Equipment Minutes of Use (DEMS) for 1996 and 1997 were taken from NECA, available on the Commission's web site at http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/neca.html. Estimated 1998 DEMs were calculated by multiplying the number of 1997 DEMs for each study area by the ratio of 1997 DEMs to 1996 DEMs for that study area. Actual 1998 DEMs classified by local, interstate and intrastate toll minutes needed for use as variables in the regression analysis are not currently available from NECA.

[870] *See* Appendix D at D-1.

data described in the *Inputs Further Notice*.[871]

386. Some parties object to our using data at the study area level, because they claim that ARMIS-filing companies report data in two distinct ways. Ameritech and US West argue that parent companies generally assign a significant portion of plant non-specific and customer operations expenses across their operating companies on the basis of an allocation mechanism.[872] As a result, they claim that a simple regression on the study area observations will produce coefficients that reflect a blend of two relationships: the cost-based relationship and the allocation-based relationship, of which only the former is appropriate to measure.[873] They argue further that it is necessary to model the allocation method explicitly, to net out the latter data, or to aggregate the data to the parent company level. Although we acknowledge that our accounting rules provide carriers with some flexibility, we expect that the allocation mechanism used by the parent company represents underlying cost differences among its study areas.[874] We find that it is reasonable to assume that the companies use allocation mechanisms that are based on cost relationships to allocate costs among their study areas. Accordingly, we find that it is reasonable to use ARMIS data at the study area level in the regression methodology.

387. Regression Methodology. As described in the *Inputs Further Notice*, we adopt standard multi-variate regression analysis to determine the portion of corporate operations expenses, customer services expenses, and plant non-specific expenses attributable to the services that should be supported by the federal high-cost mechanism.[875] We adopt an equation (Specification 1) which estimates total expenses per line as a function of the percentage of switched lines, the percentage of special lines, and toll minutes per line.[876] We use this regression methodology to estimate the expenses attributable to universal service for the following accounts:

Other Property, Plant, and Equipment (6510);

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[871] *Inputs Further Notice* at para. 217.

[872] *See* Ameritech *Inputs Further Notice* comments at 28; US West *Inputs Further Notice* comments, Attachment A at 27.

[873] *See* Ameritech *Inputs Further Notice* comments at 28; US West *Inputs Further Notice* comments at Attachment A, 27.

[874] To the extent a particular company believes that its ARMIS filings do not represent cost differences among its study areas, we would be interested in receiving more detailed information.

[875] Standard multi-variate regression analysis uses ordinary least squares with more than one variable.

[876] Expense/Total Lines = $\beta 1$ (Switched Lines/Total Lines) + $\beta 2$ (Special Lines/Total Lines) + $\beta 3$ (Toll Minutes/Total Lines).

Network Operations (6530);
Service Expense/Customer Operations (6620); and
Executive, Planning, General and Administrative (6700).

We adopt this specification, rather than an average of the two specification estimates suggested in the *Inputs Further Notice*, to separate the portion of expenses that could be estimated as attributable to special access lines and toll usage, which are not supported by the federal high-cost mechanism, from switched lines and local usage.[877] As explained below, we use an adjusted weighted average of study areas to estimate the support expense attributable to Account 6610, Marketing.

388. Several parties contend that our regression analysis is flawed.[878] Sprint, for example, claims that we have exaggerated the significance of our statistical findings beyond a level justified by the regression result; and have made the often-committed error of interpreting our regression results in a way that implies causality.[879] US West argues that, although there is a causal relationship between the level of expenses and the variables we use in the regression, the coefficient of determination or R^2 is fairly low, which implies that the causal relationship only explains a small portion of the total costs.[880] GTE claims that our regression is mis-specified because it utilizes only the mix of output as explanatory variables, and excludes important variables related to differences in input prices and production functions.[881] Because of this mis-specification and the omitted variables, GTE also claims that our equations have a low predictive ability, as measured by the R^2s.[882]

389. We disagree with commenters who claim that there is little explanatory value in our regression analysis.[883] In accounts 6620, 6700, 6530 the regressions explain a high degree

[877] *See* US West *Inputs Further Notice* comments, Attachment A at 22 (claiming it is inappropriate to average the two specifications).

[878] *See, e.g.,* Ameritech *Inputs Further Notice* comments at 25-28; GTE *Inputs Further Notice* comments at 79-82; Sprint *Inputs Further Notice* comments at 61-65; US West *Inputs Further Notice* comments at 53-57, Attachment A at 20-27.

[879] Sprint *Inputs Further Notice* comments at 61.

[880] US West *Inputs Further Notice* comments at 55.

[881] GTE *Inputs Further Notice* comments at 81.

[882] GTE *Inputs Further Notice* comments at 81.

[883] According to our calculations using the 1998 data, the R^2s for the four regressions are:

of the variability in the expense variables.[884] Only account 6510 (Other Property, Plant, and Equipment) has a low R^2, which is not surprising given the reported data in this account. Based on the 1998 ARMIS data, the resulting regression coefficient for this expense category is negative due to the numerous negative expenses reported by carriers in 1998. Because the ARMIS reports represent actual 1998 expenses incurred by the non-rural telecommunications companies within their various study areas, we find that it is appropriate to include this negative expense in our calculations. We note, however, that inclusion of this account in our calculations represents less than one percent of the total expense input for common support services expenses.[885]

390. We believe that our regressions represent a cost-causative relationship, and that common support services expenses are a function of the number of total lines served, plus the volume of minutes. Because in the long run, all costs are variable, we disagree with commenters who suggest that our methodology is flawed because we do not include an intercept term in our regression equation to represent fixed or start-up costs.[886] As discussed above, the model is intended to estimate long-run forward-looking cost over a time period long enough so that all costs may be treated as variable and avoidable.[887] Moreover, the federal high-cost mechanism calculates support on a per-line basis, which is distributed to eligible carriers based upon the number of lines they serve. We would not provide support to carriers with no lines. Nor would we vary support, which is portable, between an incumbent and a competitive eligible telecommunications carrier, based on differences in their fixed or start-up costs. We explicitly assume, therefore, that if a company has zero lines and zero minutes, it should have zero expenses. Thus, we have no constant or fixed cost in our regressions. We also believe that these expenses are driven by the number of channels, not the number of physical lines.

391. That is, our assumptions imply that expenses are a linear function of lines and minutes.[888] We next need to separate out the common support services expenses related to

Account:	6620	6700	6510	6530
R^2:	0.96	0.92	0.20	0.95

We note that the commenters' analysis was based on the 1996 ARMIS data.

[884] As we discuss below, we no longer use the regression for the 6610 account.

[885] We calculate an expense input value of -$0.05 for Account 6510 (Other Property, Plant, and Equipment) and a total expense input value of $7.32 for total common support services expenses, per line, per month.

[886] *See, e.g.,* Sprint *Inputs Further Notice* comments at 62-64 & n.15.

[887] *See supra* para. 351.

[888] Expenses = β_1 Lines + β_2 DEMS + ε.

special access lines and toll minutes, because these services are not supported by the federal high-cost mechanism. Therefore, we split the lines variable into switched and special access lines, and we split the minutes variable into local and toll minutes. In this modified equation, expenses are a function of switched lines, plus special access lines, plus local minutes, plus toll minutes.[889] We believe that changes in local minutes, however, should not cause changes in common support services expenses that are not already reflected in the expenses associated with switched lines. We find that it is reasonable to assume that local calls do not increase these overheard costs in the same way that toll minutes do. For example, in most jurisdictions local calls are a flat-rated service and additional local calling requires no additional information on the customer's bill. With toll calling, however, even subscribers that have some kind of a calling plan receive detailed information about those calls. It is reasonable to assume that adding an additional line on a subscriber's bill for a toll call causes overhead costs that are not caused by local calls. Moreover, toll calling outside a carrier's serving area involves the costs associated with completing that call on another carrier's network. As discussed below, we tested our assumption that local calls do not affect costs in the same way that toll calls do by running the regressions to include local minutes. Based on theory and our analysis, we decided to drop the local minutes variable, so that expenses are a function of switched lines, plus special access lines, plus toll minutes.[890] Because we are calculating a per-line expense estimate, we divide all the variables by the total number of lines to derive our final equation: expenses divided by total lines equals the percentage of switched lines, plus the percentage of special lines, plus toll minutes divided by total lines.[891]

392. US West claims that our regressions may not be based on appropriate cost-causative relationships, because we count special access lines by channels and not by physical pairs.[892] The ARMIS data used in the regressions count special lines as channels. That is, special access lines are counted as DS0 equivalents: a DS1 has 24 channels, and a DS3 has 672 channels. US West contends that it is far from clear how this method of counting special access lines reflects how these services cause expenses, because it is clear that DS1s and DS3s

[889] Expenses = β_1 Switched Lines + β_2 Special Lines + β_3 Local DEMS + β_4 Toll DEMs + ε.

[890] Expenses = β_1 Switched Lines + β_2 Special Lines + β_3 Toll DEMs + ε.

[891] Expenses/Total Lines = β_1 (Switched Lines/Total Lines) + β_2 (Special Lines/Total Lines) + β_3 (Toll DEMs/Total Lines) + ε'.

[892] US West *Inputs Further Notice* comments at Attachment A, 21. US West also claims that our regression analysis estimates a common support per minute of access of $0.02, which does not include any of the capital or maintenance costs associated with the switching investment used to provide access. Because the traffic sensitive common costs associated with access services alone exceeds the current access charge rate of approximately $.01 to $.02 per minute, US West claims that are analysis shows that access charges are priced below costs. US West *Inputs Further Notice* comments at 56-57. The coefficient for toll is an estimate of the increase in expenses due to an increase in 1000 toll minutes. Summing across all accounts and dividing by 1000, according to our calculations an estimate of the expense cost per toll minute is equal to $ 0.0006331807.

are not priced as if they cause 24 and 672 times the amount of expenses as a narrowband line.[893]

393. The fact that DS1s and DS3s are priced differently in the current marketplace does not imply that it is improper to count lines as channels. US West's suggested alternative, counting special lines as physical pairs, would assume that a residential customer with two lines causes the same amount of overhead expenses as a special access customer with one DS1 line. To the contrary, we find that it is reasonable to assume that more overhead expenses are devoted to winning and keeping the DS1 customer than the residential customer. Further, we expect that more overhead expenses are related to customers using higher capacity services than those using lower capacity services. Accordingly, we find that it is reasonable to use channel counts in our regression equations.[894]

394. Some commenters also criticized our regression analysis on the grounds that variables are highly correlated and that the predicted coefficients are not stable.[895] In particular, US West claims that the confidence intervals and standard errors are large and that a dividing-the-sample experiment leads to drastically different results.[896] While these commenters are correct that the correlation values are high for the raw variables, the values are not high once the variables under consideration are adjusted by dividing by total lines.[897] We find that the correlation values are all very reasonable. We note, in particular, the -1 correlation between switched lines and special lines. The fact that switched lines plus special lines equals one is the reason the regression cannot be run with a separate constant. We note that our parameterization has switched lines, special lines, and toll minutes as explanatory variables. We have chosen not to include local minutes in our regressions for theoretical reasons. So, the key correlation values are the correlations of toll minutes with special lines and with switched lines. We find that those values are reasonable.

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[893] US West *Inputs Further Notice* comments, Attachment A at 21.

[894] We note that we also count switched business lines as channels in our regression equations.

[895] *See, e.g.,* Ameritech *Inputs Further Notice* comments at 27-28; GTE *Inputs Further Notice* comments at 79-80; US West *Inputs Further Notice* comments, Attachment A at 21-22.

[896] US West *Inputs Further Notice* comments at 53-57, Attachment A at 20-27.

[897] The correlation matrix for the variables under consideration is:

	switched	special	toll	local
switched	1.00	-1.00	0.54	0.06
special	-1.00	1.00	-0.54	-0.06
toll	0.54	-0.54	1.00	-0.13
local	0.06	-0.06	-0.13	1.00

395. Several commenters suggested that we use local minutes as an explanatory variable.[898] Despite our tentative conclusion that our regressions should not include local minutes as a variable, in response to these comments, we re-ran each of the regressions with local minutes per line as an additional variable. In three of the four regressions, the coefficient for local minutes was not significant at the five percent level, and for account 6700, its sign was the opposite of what was expected.[899] The resulting difference in the estimated expenses attributable to supported services was very small in magnitude as well. If we used the local minutes variable in our parameterization, after summing across all expense accounts, our per-line, per-month estimate for a switched line would be approximately $0.01 more.[900] Given our belief that local minutes should not influence these expenses, the lack of significance in the coefficients, and the overall lack of impact when the variable was consistently included in the regressions, we conclude that we should not include local DEMs per line in our specifications.

396. Except for the inclusion of local minutes as a variable, no commenters have suggested a better parameterization or methodology for using the ARMIS data to estimate expense inputs for these accounts. Further, no commenters have suggested an alternative publicly available data set to use for our estimation of expense input values. We acknowledge that there is substantial variation in the underlying expense data taken from the ARMIS reports. Common support services expenses often contain charges unrelated to the specified relationships in the regression equation. For example, there are many one-time expenses and non-recurring charges associated with these accounts. We have tried to limit the effect of this problem by making adjustments to the expense data, as discussed below. Given the data limitations and the parameterization we have chosen, we find that the estimated coefficients are the best estimate of the applicable expenses, regardless of the resulting standard errors.

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[898] *See, e.g.*, Ameritech *Inputs Further Notice* comments at 25-28; GTE *Inputs Further Notice* comments at 79-82; Sprint *Inputs Further Notice* comments at 61-65; US West *Inputs Further Notice* comments at 53-57, Attachment A at 20-27.

[899] *See* Appendix D at D-6.

[900] The table below shows the cost per switched line without local minutes in the equation (nloc), with local minutes in the equation and an average number of local minutes for each line (wloc), and the difference between the two in dollars.

	nloc	wloc	diff
lm6620	3.39	3.62	-0.24*
lm6700	2.47	2.18	0.30
lm6510	-0.05	-0.05	0.00
lm6530	1.41	1.48	-0.07

We note that the 6620 account is the one regression where local minutes variable is significant. In the other cases it is not.

397. Removal of One-Time Expenses. In the *Inputs Further Notice*, we discussed our efforts to adjust estimates of common support services expenses to account for one-time and non-recurring expenses.[901] We sought comment on the need for information about and estimates of various types of exogenous costs and common support service expenses that are recovered through non-recurring charges and tariffs. These expenses include specific one-time charges for the cost of mergers or acquisitions and process re-engineering, and network and interexchange carrier connection, disconnection, and re-connection (i.e., churn) costs.

398. In the *Inputs Further Notice*, we tentatively concluded that we should not use an analysis submitted by AT&T and MCI to estimate one-time and non-recurring expenses for corporate and network operations expenses.[902] This analysis averaged five years (1993-1997) of data from Security and Exchange Commission (SEC) 10-K and 10-Q filings for all tier one companies to identify and calculate a percentage estimate of corporate and network operations expenses classified as one-time and non-recurring charges associated with these types of activities. Our tentative conclusion not to rely on the AT&T and MCI analysis to make these adjustments was based on the fact that we were using 1996 ARMIS data to estimate the expense inputs. Because the SEC reports do not indicate whether the one-time expenses were actually made solely during a specific year indicated, we tentatively concluded that we could not use the analysis' five year average or the actual 1996 SEC figures to make adjustments to the 1996 ARMIS data. In the *Inputs Further Notice,* we noted however that the AT&T and MCI analysis indicates that one-time expenses for corporate and network operations can be significant.[903] We sought comment on how to identify and estimate one-time and non-recurring expenses associated with these common support services.

399. AT&T and MCI disagree with our tentative decision to reject their one-time cost estimates and argue that it is better to estimate one-time costs through use of the SEC reports, although these reports may imperfectly establish the precise date of the occurrence, than to fail to exclude these costs at all.[904] Although some LEC commenters may agree that we should adjust our estimates to exclude one-time and non-recurring expenses, they provide no data or methodology to accomplish this, other than suggesting that we should get this

[901] *Inputs Further Notice* at paras. 220-225.

[902] *Inputs Further Notice* at para. 221.

[903] *Inputs Further Notice* at para. 221.

[904] AT&T/MCI *Inputs Further Notice* comments at 45-46.

information from the companies.[905] GTE claims that unless companies implement specific tracking mechanisms, these data are not generally or easily identified after the fact.[906]

400. We now reconsider our tentative conclusion not to use the analysis submitted by AT&T and MCI to adjust our network and corporate operations expense estimates to account for one-time and non-recurring expenses. We do so for a number of reasons. First, we received no additional information on publicly available data sources or other reasonable methods to estimate these one-time and non-recurring costs at this time. Second, the problems associated with determining the actual costs of 1996 one-time expenses based on the SEC reports are obviated because we are using 1998 expense data to estimate the forward-looking input values. We find that using the estimated average of one-time costs over the five preceding years (1993-1997) to adjust 1998 data is a reasonable method to determine the impact of costs related to mergers and acquisitions and work force restructuring. Further, we believe any adjustments for one-time costs based on the AT&T and MCI analysis may be biased downward after comparing the number of companies involved in these types of activities in 1998 and 1999 to those in 1993-1997.[907] Accordingly, we adjust downward estimated expenses in account 6530 (Network Operations) by 2.6 percent and in account 6700 (Executive, Planning, General, and Administrative) by 20 percent.

401. Removal of Non-Supported Expenses. In the *Inputs Further Notice*, we also discussed our efforts to adjust marketing and other customer service expenses to account for recurring expenses that are not related to services supported by the federal high-cost mechanism.[908] The non-supported expenses we attempted to identify include vertical features expenses, billing and collection expenses not related to supported services, operational support

[905] SBC does not believe one-time and non-recurring costs are significant, but agrees that they should be excluded to the extent they are significant. SBC suggests we could either base our inputs on company data that does not include these costs or base the inputs on data from years where it is known that no one-time or non-recurring activities occurred. SBC *Inputs Further Notice* comments at 20. Sprint suggests that current information with respect to one-time corporate operations expenses should be supplied by the companies on an annual basis. Sprint *Inputs Further Notice* comments at 65. GTE, on the other hand, agrees with our tentative conclusion and argues that we should not attempt to adjust our input values for one-time, non-recurring, and non-supported costs. GTE argues that, if we do so, we should also adjust our estimates to account for certain cost increases due to regulatory requirements, and other factors. If any adjustments are made, GTE claims that company-specific cost adjustments would have to be requested from each company annually. GTE *Inputs Further Notice* comments at 82.

[906] GTE *Inputs Further Notice* comments at 82.

[907] The following companies have either filed notice with the Commission or have indicated in the press that they were or are actively engaged in merger discussions and activity: Bell Atlantic, GTE, US WEST, Ameritech, SBC, Frontier, Puerto Rico Telephone, Cincinnati Bell, Aliant Communications, and Sprint.

[908] *Inputs Further Notice* at para. 221, 223-225.

systems and other expenses associated with providing unbundled network elements and wholesale services to competitive local exchange carriers. We proposed adjustments to extract non-supported service costs related to marketing, which is discussed separately below,[909] coin operations, published directory, access billing, interexchange carrier office operation, and service order processing.[910] Specifically, we made percentage reductions to the regression coefficient results for specific expense accounts based on a time trend analysis of average ARMIS 43-04 expense data for five years (1993-1997).

402. Some commenters argue that our proposed methodology removes non-supported services twice because these expenses were already taken out by the regression when expenses are subdivided among switched lines, special lines, and toll minutes.[911] Although we agree, as discussed below, that our methodology double counted the marketing expenses associated with special access lines, we do not agree with the theory that combining a percentage reduction with the regression methodology invariably removes expenses twice. For example, vertical features associated with switched lines such as call waiting are not supported, but the expenses associated with call waiting are not removed using the regression analysis. If we had the data to separately identify and remove vertical features expenses from switched lines, we believe that it would be appropriate to do so and to continue using the regression analysis to separate the remaining expenses. Nonetheless, upon further analysis, we find that we should not adopt our proposed method of removing these non-supported recurring expenses. We find that this method is not sufficient to adequately identify non-supported common support service expenses due to differences in account classifications from the ARMIS 43-03 and ARMIS 43-04 reports. Therefore, we do not utilize the time trend analysis or take reductions for these non-supported expenses in the input values at this time. We recognize that this causes an overstatement of in our estimate of the expenses attributable to supported services in account 6620 (Service Expense and Customer Operations). Unlike the case with marketing, however, we do not have an alternative source of information on which to base a methodology for removing the non-supported expenses in this account. We plan to seek comment on a verifiable and systematic method to identify and remove these costs in the proceeding on the future of the model.

403. Marketing. As explained in the *Inputs Further Notice,* we made an adjustment to the Account 6610 (Marketing)[912] regression coefficient based on an analysis made by

[909] *See infra* paras. 403-407.

[910] *See Inputs Further Notice* at para. 225.

[911] *See, e.g.,* GTE *Inputs Further Notice* comments at 84; Sprint *Inputs Further Notice* comments at 67.

[912] Account 6610 Marketing consists of three sub-accounts: 6611 Product Management, 6612 Sales, and 6613 Advertising.

Economics and Technology, Inc. (ETI).[913] The ETI analysis offered a method for disaggregating product management, sales, and advertising expenses for basic (residential) telephone service from total marketing costs. Based on information from the New England Telephone Cost Study, ETI attributed an average of 95.6 percent of company marketing costs to non-supported customers or activities, such as vertical and new services. Relying on this analysis, we reduced the input estimate to reflect 4.4 percent of marketing expenses determined by the regression. In the *Inputs Further Notice*, we tentatively concluded that this was the most accurate method on the record for apportioning marketing expenses between supported and non-supported services.[914]

404. We agree with commenters that, in making this adjustment to the post-regression analysis input estimate, we incorrectly estimated marketing expenses because reductions were taken twice for special access lines.[915] We agree with the commenters that any adjustments to exclude expenses based on the type of service should be made from total relevant marketing expenses rather than the regression results. Therefore, we do not use the regression methodology to estimate marketing expenses. Instead, using the 1998 ARMIS data, we adjust the total weighted average of relevant expenses for all study areas.

405. Commenters also point out that the adjustment figure of 4.4 percent based on the ETI Study as initially reported was determined under the assumption that only expenses attributable to residential local service would be supported.[916] Further, the ETI estimate of costs associated with the marketing of supported services was calculated by taking a percentage of expenses only from Account 6611, Product Management. Specifically, the ETI estimate did not include any relevant expenses from Account 6613, Product Advertising. As noted in the *Inputs Further Notice*, funding support for marketing is to be based on those expenses associated with advertising. Section 214 of the Communications Act requires eligible telecommunications carriers to advertise the availability of residential local exchange and universal service supported services.[917] Moreover, we note that under the current high

[913] *Inputs Further Notice* at para. 224.

[914] *Inputs Further Notice* at para. 225.

[915] *See, e.g.,* Sprint *Inputs Further Notice* comments at 65-66 (arguing direct reduction of total company marketing expenses for only ETI factor is an acceptable method); Ameritech *Inputs Further Notice* comments at 29; US West *Inputs Further Notice* comments, Attachment at 27-28.

[916] *See,, e.g.,* Ameritech *Inputs Further Notice* comments at 29; GTE *Inputs Further Notice* comments at 83; US West *Inputs Further Notice* comments, Attachment at 28.

[917] 47 U.S.C. § 214(e)(1)(B).

cost loop support mechanism, carriers receive no support for marketing.[918]

406. We received further documentation and an alternative analysis from ETI which included an estimate for advertising expenditures.[919] The revised analysis included proportional allocations of advertising costs based on the percentage of lines estimated for primary line residential service and single-line business service. ETI also used line count source material from the Preliminary Statistics of Common Carriers 1998 rather than relying on 1996 data used in its original analysis.

407. Based on the new information provided and the lack of any reasonable alternative presented by the commenters, we calculate an input estimate of supported advertising expenses using the ETI study and 1998 ARMIS expenses.[920] By adding a proportional allocation for multi-line business advertising expenses to the ETI alternative analysis (which only included an estimate representing primary line and single line business advertising costs), we conclude that 34.4 percent of Account 6613, Product Advertising, would be the most appropriate expense amount for the advertising of universal service.[921] Because the additional data provided by ETI allowed for the calculation and estimate of supported and non-supported advertising expenditures, we did not allocate costs associated with product management or sales. As previously mentioned, these marketing activities are not specifically required for support under Section 214 of the Communications Act and currently receive no high cost loop support. Taking 34.84 percent of total 1998 advertising expenses for the 80 non-rural high cost study areas and dividing by total lines per month, the average per line per month input value for advertising support is $0.09. This level of advertising expenses represents 5.82 percent of total 1998 marketing costs for non-rural carriers.

408. Local Number Portability. There is an additional input value that we estimate separately from our consideration of other expense input values. Specifically, the synthesis

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[918] *See, e.g.,* NECA, Universal Service Fund 1999 Submission of 1998 Study Results, Oct.1, 1999 at Tab 2. The data collection instructions identify the accounts that are included in calculating high-cost loop support. Accounts 6610 (Total Marketing), 6611(Product Management), 6612(Sales), and 6613(Advertising) do not appear in the list of accounts included in calculating high-cost loop support.

[919] *See* Susan Baldwin, An Alternative Analysis of Marketing Expenses Related to Calculation of USF Support. This paper supplements the earlier ETI study: Susan M. Baldwin, Lee L. Selwyn, Economics and Technology, Inc. *Converging on a Cost Proxy Model Primary Line Basic Residential Service,* August 1996.

[920] *See* Appendix D at D-7 for analysis. For further information regarding formulas and calculations, see the spreadsheet posted on the Commission's Web site.

[921] Although the statute requires advertising of the supported services, as noted above, we do not find that this requires advertising of secondary lines to consumers already receiving the supported services.

model has a user-adjustable input for the per-line costs associated with local number portability (LNP). In the *Inputs Further Notice*, we proposed a per-line monthly LNP cost of $0.39, based on a weighted average of the LNP rates filed by the LECs available at that time.[922] AT&T and MCI point out that the Commission suspended and investigated some of those rates, and that the rates we approved are generally lower than the rates we used to estimate our LNP input value.[923] They argue that we should use the line-weighted nationwide average of approved LNP rates, which they estimate currently is $.032.[924] GTE claims that there is no justification for using the nationwide average LNP rate, as suggested by AT&T and MCI, because the approved LNP rates provide the best representation of each company's LNP costs.[925] We agree with GTE and in this instance depart from our general practice of using nationwide input values in the federal universal service support mechanism. Because the Commission has investigated and approved LNP rates for most LECs, we find that it is appropriate to use the company-specific input values listed in Appendix D.[926] For those carriers that have not yet filed an LNP tariff, we will use the line-weighted nationwide average of approved LNP rates.

D. GSF Investment

1. Background

409. GSF investment includes buildings, motor vehicles, and general purpose computers. The synthesis model platform uses a three-step algorithm to estimate GSF investment. First, for each study area, the model calculates a GSF investment ratio for each GSF account by dividing the ARMIS investment for the account by the ARMIS total plant in service (TPIS) less GSF investment. The values proposed in the *Inputs Further Notice* used 1996 ARMIS data in this step.[927] Second, the model calculates a preliminary estimate for GSF investment for each account by multiplying the model's estimate of TPIS by the GSF investment ratios developed in step one.[928] Third, the model reduces the preliminary GSF

[922] *See Inputs Further Notice* at Appendix A, A-31.

[923] AT&T/MCI *Inputs Further Notice* comments at 47.

[924] AT&T/MCI *Inputs Further Notice* comments at 47.

[925] GTE *Inputs Further Notice* reply comments at 32.

[926] *See* Appendix D at D-8.

[927] In the synthesis model, ARMIS data for each non-rural study area are contained in the "1996 Actuals" tab of the expense modules.

[928] As calculated by the model, TPIS excludes GSF investment.

investment estimates for each account by multiplying these estimates by one of two factors.[929]

410. In the *Inputs Further Notice*, we tentatively concluded that the model's preliminary estimates of GSF investment should be reduced in the third step of the algorithm, because only a portion of GSF investment is related to the cost of providing the services supported by the federal mechanism, but that we should not use the same factors as those used in the HAI model.[930] We noted that the HAI sponsors used one factor for some accounts and a different factor for others, but had not explained why either particular factor should be used.[931] Rather than using two different factors, we proposed using a factor that reflects the percentage of customer operations, network operations, and corporate operations used to provide the supported services. Specifically, we proposed calculating preliminary GSF investment on a study area specific basis (steps one and two), and then multiplying these estimates by a nationwide allocation factor derived from the regression methodology that we used to estimate the portion of common support services expenses attributable to switched lines and local usage.[932]

2. Discussion

411. We conclude that the model's preliminary estimates of GSF investment should be reduced in the third step of the algorithm, because we find that only a portion of GSF investment is related to the cost of providing the services supported by the federal mechanism. In response to certain comments, however, we modify our proposed allocation factor, as discussed below. Although we reject commenters' arguments that the preliminary GSF investment should not be reduced at all, we agree that we should not exclude facility-related

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[929] The synthesis model platform incorporates HAI's expense and GSF module. *See Platform Order*, 13 FCC Rcd at 21361, para. 91.

[930] *Inputs Further Notice* at 211.

[931] The HAI model used the following two factors to reduce the preliminary GSF investment estimates: (1) one minus the Total Operations General Support Allocator (Total Operations Allocator) or (2) the Office Worker General Support Allocator (Office Worker Allocator). Each of these allocators is a fraction. The Total Operations Allocator is the ratio of the sum of customer operations expenses and corporate operations expenses to total operating expenses. The Office Worker Allocator is the ratio of the sum of corporate operations expenses and network operations expenses to the sum of customer operations expenses, corporate operations expenses and network operations expenses. The Total Operations Allocator is applied to the Motor Vehicles, Garage Work Equipment, and Other Work Equipment accounts. The Office Worker Allocator is applied to the Furniture, Office Equipment, Buildings and General Purpose Computer accounts. *See* HAI Dec. 11, 1997 submission.

[932] The proposed ratio was the sum of customer operations expenses, network operations expenses, and corporate operations expenses attributable to the supported services, to the sum of those expenses calculated on a total regulated basis.

maintenance expenses in our proposed allocation factor. In addition, we modify our method of calculating the denominator of our allocation factor so that both the numerator and denominator are simple averages. Finally, we clarify that the ARMIS TPIS used in the first step of the algorithm excludes ARMIS GSF investment.

412. Reduction of Preliminary GSF Estimate. Several LEC commenters argue that the preliminary GSF investment should not be reduced by an allocator in the third step of the algorithm.[933] SBC contends that the factor we use to reduce our preliminary GSF investment estimates substantially underestimates the GSF amounts related to the supported services.[934] SBC claims that the ratios used to estimate the preliminary GSF investment already provides a reasonable basis for allocating GSF to supported services, because the GSF ratio (derived from the ARMIS accounts) is only applied to investment identified by the model as associated with supported services.[935] BellSouth also claims that the TPIS calculated by the model is the investment necessary to provide the supported services and that no further reductions in the preliminary GSF investment estimate are appropriate.[936] Sprint similarly claims that by applying a book GSF ratio to the forward-looking plant necessary to provide supported services, the modeled GSF plant also has been converted to a forward-looking level necessary to provide the supported services. Sprint contends that applying an additional allocator is not necessary and has the effect of reducing GSF plant twice.[937]

413. We disagree with SBC's contention that only a portion of GSF is assigned to supported services in deriving our preliminary estimates of GSF investment.[938] To the contrary, the GSF ratio is applied to all model investment, which includes the investment required to provide both supported and non-supported services. As discussed above, the

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[933] *See, e.g.,* BellSouth *Inputs Further Notice* comments at Attachment B, B-21; SBC *Inputs Further Notice* comments at 17; Sprint *Inputs Further Notice* comments at 59-60. US West also claims generally that our multi-step process results in a significant reduction in costs "assumed to be recoverable." US West *Inputs Further Notice* comments at 47.

[934] SBC *Inputs Further Notice* comments at 17.

[935] SBC *Inputs Further Notice* comments at 17.

[936] BellSouth *Inputs Further Notice* comments at Attachment B, B-21.

[937] Sprint *Inputs Further Notice* comments at 59-60. Sprint also claims that we used a mathematically incorrect method to compute the GSF ratio by including ARMIS GSF investment in the denominator and then applying that to TPIS investment as calculated by the model, which does not include GSF investment. We clarify below, that the ARMIS GSF investment used in the denominator also excludes GSF investment, and we thus calculate the ratio as Sprint suggests: ARMIS GSF plant divided by ARMIS TPIS less ARMIS GSF plant. *See infra* para. 417.

[938] *See SBC Inputs Further Notice* comments at 17.

model estimates the cost of providing services for all businesses and households within a geographic region, including the provision of special access, private lines, and toll services.[939] Because these services are not supported by the federal high-cost mechanism, the preliminary GSF investment estimate must be adjusted to reflect the portion of GSF investment attributable to the supported services. Thus, BellSouth's assertion that the TPIS calculated by the model is the investment necessary to provide the supported services is wrong. For the same reasons, we reject Sprint's argument that, by applying the book GSF ratio, the modeled GSF plant has somehow been converted to a forward-looking level necessary to provide the supported services. On the contrary, the conversion estimates the amount of GSF investment attributable to all services, supported and non-supported. The second reduction is required to estimate the amount of GSF investment that should be supported by the federal universal service support mechanism.

414. Allocation Factor. Assuming that we use an allocator to reduce preliminary GSF investment, several commenters criticize the particular allocator that we proposed in the *Inputs Further Notice*. For example, GTE questions why we used only expenses for customer operations, network operations, and corporate operations in the allocation calculation and excluded plant-specific expenses.[940] GTE argues that plant-specific operations also use GSF investments and should be counted in the calculation. SBC also argues that GSF investment supports all aspects of a LEC's operations, and contends that it makes no sense to exclude facility-related maintenance expenses in our proposed allocation factor.[941] We agree that expenses for plant-specific operations expenses should be included in our calculation of the nationwide allocation factor derived from the regression methodology. Accordingly, the allocation factor we adopt to estimate GSF investment includes plant-specific operations expenses.[942]

415. GTE also contends that the forward-looking way to calculate a GSF investment ratio is to convert all ARMIS investments to current values using current-to-book ratios,

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[939] *See supra* paras. 49, 391.

[940] GTE *Inputs Further Notice* comments at 77. Although GTE agrees that we should not base a reduction to the preliminary GSF investment on the same factors used in the HAI model, GTE claims our proposed methodology has several problems.

[941] SBC *Inputs Further Notice* comments at 18.

[942] Due to equations embedded in the HAI expense module, the total operations general support allocator is set equal to one minus the office worker general support allocator. That is, because one factor is one minus the other in the HAI expense module, to use the same allocation factor for all GSF investment, we must enter one minus the factor in some instances. *See* Appendix D at D-9.

before calculating an adjusted ARMIS GSF to TPIS investment ratio.[943] Although we concede there is some logic to GTE's argument that we should convert ARMIS GSF investments to current values by using current-to-book ratios, we note that this would require a change in the model platform. As we explain above, the model platform uses a three-step algorithm to estimate GSF investment.[944] Although we can easily change the input value for the factor used in step three, we could not adjust the ARMIS data by applying a current-to-book factor without modifying the model platform.[945] Proposals to change the model platform are properly addressed in response to pending petitions for reconsideration of the *Platform Order* or the proceeding on the future of the model.

416. Finally, GTE claims that our estimation of the universal service portion of the GSF investment is flawed because our regression methodology uses a wrong specification and incorrectly excludes expenses.[946] GTE also claims that the calculation allocator itself is flawed because the numerator is a simple average of expenses derived from the regression results, but the denominator is a weighted average of the total expenses developed from ARMIS data.[947] GTE argues that the type of average in the numerator and denominator should match.[948] While we do not agree that our regression methodology is flawed, we find that GTE has pointed out an inconsistency in our GSF methodology. Specifically, we agree that we should use the same type of average in both the numerator and denominator of our allocation factor. As a result, we use the simple average of total expenses in the denominator of the allocation factor we adopt for estimating the portion of GSF attributable to supported services.[949]

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[943] GTE *Inputs Further Notice* comments at 77.

[944] *See supra* para. 409

[945] We also do not at this time consider Bell Atlantic's suggestion that we develop GSF investments on some other basis, such as an activity based approach, rather than as a ratio of investment. *See* Bell Atlantic *Inputs Further Notice* comments at 21. Such an approach also would require changes to the model platform.

[946] GTE *Inputs Further Notice* comments at 77-78.

[947] GTE *Inputs Further Notice* comments at 78.

[948] GTE *Inputs Further Notice* comments at 78.

[949] Specifically, the GSF allocator is the ratio of universal service expenses to total company expenses. Universal service expenses are determined by the following: switched lines to total lines times loop maintenance plus switched lines to total lines times circuit maintenance plus local DEMs to total DEMs times switch maintenance plus $7.32, which is the per-line, per month amount for the common support services expenses attributed to the supported services, as discussed above. *See supra* note 855. Total company expenses are the sum of loop maintenance, circuit, switch maintenance, and the total corporate overhead. This allocator is .6769.

417. Clarification. BellSouth claims that the algorithm used to estimate GSF investment contains an error in consistency. BellSouth suggests that in step one we should determine the ratio of ARMIS-based GSF investment to the ARMIS-based TPIS less GSF investment.[950] In step two, this ratio is multiplied by the TPIS investment determined by the model, which excludes GSF. We clarify that the model calculates GSF investment as BellSouth suggests it should. That is, the model uses ARMIS-based TPIS less GSF investment.[951] US West claims that in the second step of the algorithm the synthesis model includes only fifty percent of the building investment and no land investment.[952] The synthesis model incorporates the HAI switching and expense modules and calculates the investment related to wire center buildings and land in the switching module. So, US West is mistaken that fifty percent of the building and land investment is eliminated, because this investment is added back in calculating switching costs.[953]

418. For the reasons stated above, we adopt input values for GSF investment that reflect the portion of GSF investment attributable to the cost of providing the services supported by the federal mechanism. Specifically, we calculate preliminary GSF investment on a study area specific basis, using 1998 ARMIS data, and then multiply these estimates by a nationwide allocation factor derived from the regression methodology that we used to estimate the portion of common support services expenses attributable to switched lines and local usage and the portion of plant-specific operations expenses attributable to the supported services.[954] The allocation factor is the sum of plant specific operations expenses, customer operations expenses, network operations expenses, and corporate operations expenses attributable to the supported services, divided by the sum of those expenses calculated on a total regulated basis.

VIII. CAPITAL COSTS

A. Depreciation

1. Background

419. We now consider the inputs related to the calculation of depreciation expenses.

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[950] BellSouth *Inputs Further Notice* comments at Attachment B, B-20.

[951] This can be verified by examining the formulas in the " 96 Actuals" tab of the expense modules.

[952] US West *Inputs Further Notice* comments at 48.

[953] To the extent that not all of the land investment is included in the synthesis model logic, such a change would require a change to the model platform.

[954] *See* Appendix D at D-9.

The model uses "adjusted projection lives" to recover the current costs of the assets.[955] Under this approach, the annual depreciation charges associated with an asset are computed by dividing the asset's current cost by its adjusted projection life.[956] A shorter life will increase the annual depreciation expense.

420. In the *Universal Service Order*, the Commission concluded that "economic lives and future net salvage percentages used in calculating depreciation expense should be within the FCC-authorized range" and use currently authorized depreciation lives.[957] In the *1997 Further Notice*, the Commission tentatively concluded that it should adopt depreciation expenses that reflect a weighted average of the rates authorized for carriers that are required to submit their rates to us.[958] The Commission also sought comment on whether adjusted projected asset lives should reflect the lives of facilities and equipment dedicated to providing only the services supported by universal service or whether the asset lives should reflect a decision to replace existing plant with plant that can provide broadband services.[959] The *May 4 Public Notice* requested further information on these issues.[960]

421. In the *Inputs Further Notice*, we tentatively adopted a method of depreciation that should be used in the model, i.e., how depreciation allowances should be allocated over the life of an asset.[961] Because the Commission's depreciation accounting rules require the use of straight-line equal-life-group depreciation, rather than a more accelerated depreciation method, we tentatively concluded that this method, which is used for all Commission-

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[955] *1997 Further Notice,* 12 FCC Rcd at 18570, para. 149. The projection life of an asset is the asset's expected service life at installation, reflecting not only the physical life of the equipment, but also the obsolescence associated with the replacement of older equipment with equipment that uses new technologies and forecasts of future replacements. The adjusted projection life of an asset is its projection life adjusted by its future net salvage value. Future net salvage is the percentage of the asset's value that the owner expects to obtain when selling the asset at the end of its useful life. *Id.*

[956] Depreciation charges are computed in this manner for the first year. In subsequent years, depreciation charges are computed using reserve.

[957] *Universal Service Order*, 12 FCC Rcd at 8913-14, para. 250 (criterion 5).

[958] *1997 Further Notice*, 12 FCC Rcd at 18571, para. 152.

[959] *Id.*

[960] *See Inputs Public Notice.*

[961] *Inputs Further Notice* at para. 231.