Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Unbundled Access to Network Elements	)	**WC Docket No. 04-313**
	)	
	)	
Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers	)	**CC Docket No. 01-338**

REPLY DECLARATION OF ANTHONY FEA
ON BEHALF OF AT&T CORP.

1. I am the same Anthony Fea who submitted a joint declaration with Anthony Giovannucci in support of AT&T's initial comments.

2. The purpose of this reply declaration is to explain why (i) incumbent LECs have a clear natural monopoly-based competitive advantage arising directly from the ubiquitous fiber loop and transport facilities they have deployed as the dominant providers of local telecommunications services; (ii) the incumbents' incremental costs of adding new capacity to serve enterprise customers are substantially lower than competitors' incremental costs to provide comparable capacity; (iii) these advantages preclude competitive carriers from building their own new loop or transport facilities unless they will be used to carry very substantial committed demand over very short distances; and (iv) competitive carriers rarely construct alternative "dedicated transport."

3. The Commission has previously recognized that the fact that most of the incumbents' costs are sunk gives them enormous advantages over competitors that deter entry. As the Commission has explained, "[s]unk costs are those costs that are unrecoverable upon exit from the market. Scholars point out that when there are large fixed and sunk costs, fewer firms are able to profitably coexist in the industry. Significant sunk costs by the incumbent can increase an entrant's concern that an incumbent will lower prices in the face of vigorous competition. In addition, large sunk costs can give a significant first-mover advantage to the incumbent. Other firms that are contemplating entry will realize that large-scale facilities-based entry on their part will create excess capacity and force prices down to marginal cost, leading to large losses. These firms are therefore unlikely to enter. High sunk costs also increase the cost of failure to an entrant. Thus, if there is a substantial risk that entry will not be successful for various reasons, including uncertainty concerning demand for the firm's product and the firm's operational ability to enter the market and achieve profitability, then the presence of large sunk costs could raise the cost of failure and exit sufficiently to deter entry. This risk could also be reflected in a higher cost of capital to entrants, thus discouraging entry into industries which are inherently risky." *See Triennial Review Order* ¶ 75 n.244.[1]

[1] *See also Triennial Review Order* ¶ 80 ("[w]hen combined with scale economies, high sunk costs increase the entrants' concern that the incumbent will lower its prices in response to entry, possibly to unprofitable levels for both incumbents and entrants. Large sunk costs also increase the cost of failure, so if there is a substantial risk of failure, entrants may be reluctant to take the risk, and investors may be reluctant to finance entry"); *id.* ¶ 88 ("[s]unk costs, particularly when combined with scale economies, can pose a formidable barrier to entry. Sunk costs increase risk as well as an entrant's cost of failure, which in turn can increase the cost of capital and discourage entry. In addition, an entrant that knows that an incumbent LEC has incurred substantial sunk costs may be disinclined to enter a market because the incumbent LEC is

4. The incumbents' natural monopoly is directly traceable to the nature of the fiber facilities that the Bells and other incumbent LECs have been incorporating into their networks for well over a decade. Even before passage of the 1996 Act, the Bells aggressively deployed fiber facilities throughout their networks. By 1991, they had collectively placed about 65% of their interoffice working facilities on fiber. By 1996, they had transitioned almost 94% of those facilities to fiber and by 1999 more than 95% of their working interoffice channels were on fiber.[2] Moreover, these results are consistent across holding company: as of 1999, the applicable percentages were: SBC 98%, BellSouth 95%, US West 95%, Bell Atlantic 87% and GTE 80%. *See*, Infrastructure of the Local Operating Companies, October, 2000 ("2000 Infrastructure Report", Tables 2.2-2.9, at 17-24, Interoffice Working Facilities: fiber/(fiber+radio+copper)). Thus, the Bells had already incurred the cost of laying the vast majority of their interoffice fiber – including but not limited to the associated infrastructure supports, cable and an abundant quantity of unused fiber strands – before competitive carriers even had the opportunity to enter their local markets. Moreover, unlike competitive carriers – who must raise increasingly scarce and more costly capital when construction is required – the Bells' construction costs were principally provided by captive ratepayers.

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likely to drop its prices, possibly to levels below average cost, in response to entry. In these ways, sunk costs can act to give significant first-mover advantages to incumbent LECs").

[2] The Commission ceased providing the "Infrastructure of Local Operating Companies" with its 1999 report issued in October of 2000. It ceased requiring that the Bell report ARMIS detail that permitted calculation of the identified percentages in 2001. However, given the extremely high proportions, no material changes were apparent in the 2001 data.

5. The reason the Bells incorporated so much spare capacity into their initial fiber builds is well understood. As the Commission correctly recognized, "A large portion of the cost of fiber deployment is associated with labor and installation rather than with the cable itself. Thus, the incremental cost of installing a larger fiber cable is typically relatively small." *Triennial Review Order* n. 12. The record here (*e.g.*, D'Apolito/Stanley Dec.) similarly supports the conclusion that facility construction costs remain very high – generally $125,000 per mile, and often multiples of that cost, especially in dense commercial areas of large cities. Because of this economic reality, the Bells – as would any other prudent carrier – installed many unused strands that could be lit as future demand required. As noted in my previous declaration, deploying numerous unlit spare strands on a new route is inexpensive insurance that new and costly construction will not be required.

6. The Commission recognized this fact as well, finding as early as 1999 that, "Although data on links [transport] and channels [loops] show that circuits connecting local central offices could typically be provided on only two fibers, the economics of fiber deployment have resulted in deployment of typical fiber cables containing more than 40 fibers. This suggests that there is a significant amount of fiber capacity currently unused in the *interoffice* transmission plant." 2000 Infrastructure Report at 5.

7. In fact, the Bells' own data show that the amount of unused strands in their networks has *increased* over time. In 1991, the Bells reported that, on average, they deployed 28 strands per cable, but by 1999, the average increased to 49

strands per cable (1998 Fiber Update, Table 7), and the proportion of lit fiber was generally well below 50% (*id.*, Table 9).[3]

8. Moreover, replacement of old copper cables with fiber was quite efficient for the Bells. A fiber cable just over 1 inch in diameter can carry 864 strands[4] – which can provide several orders of magnitude more capacity than a copper cable of the same size. Therefore, the Bells did not face conduit space constraints in deploying huge amounts of added capacity. Indeed, these fiber-for-copper swaps provided the Bells significant economies, because they were able to replace physically larger (but much smaller capacity) copper cables with much higher capacity fiber in their existing ducts. Moreover, as I explained in my prior declaration, the cost of incremental fiber strands is only about 3 cents per strand per foot, while the cost of infrastructure construction can cost as much as $25 to $75 per foot or more. Thus, it was practical for the Bells to incur the small costs for additional fiber strands in order to avoid the enormous cost of infrastructure construction should demand exceed forecast and exhaust the deployed capacity.

9. The Bells' existing facility networks and widespread fiber deployment have provided them with significant cost advantages against new rivals who must construct their own facilities. Indeed, the Commission has recognized the efficiencies the Bells achieved by deploying excess fiber capacity in their networks:

[3] AT&T typically deploys metro fiber with even more strands per cable and other carriers in this proceeding indicate consistent practices.

> [F]iber cable occupies considerably less conduit space than copper cable and therefore economizes on the use of existing conduit facilities. Furthermore, once a decision to deploy fiber has been justified, the cost of the cable itself may actually contribute less to the total deployment cost than the associated labor costs. This space saving aspect of fiber, coupled with the desire to avoid costly future redeployments, minimize the environmental effects of redeployment, and provide for future broadband digital capabilities, and may contribute to a decision to construct fiber capacity that exceeds current demand. 1998 Fiber Update at 23.
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> [S]ignificant capacity increases made possible by state-of-the-art terminal facilities – whose costs should decline over time – will tend to make incremental cost of adding network capacity even lower. *Id.* at 8.
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> The cost of the underlying fiber network is mileage sensitive. Once constructed, the cost of adding terminals is less a function of mileage than the number of network links. *Id.* n.9.

10. And the Bells' advantages are not limited to interoffice transport. Their extensive deployment of fiber transport also brought their fiber very close – if not directly into – the premises of many of their largest business customers. Indeed, the Bells themselves acknowledged that deployment of fiber interoffice facilities made it more feasible to address customer loops. They stated as early as 1998 that it was becoming difficult for them to provide data on their interoffice facilities separately from data on fiber and copper facilities used to serve subscribers, *i.e.*, loops. Thus, the Commission's 1998 Update notes that, "Typically [the Bells] claim that many facilities are jointly used for interoffice and subscriber applications ..." *Id.* at 24. In fact, the Bells acknowledged that by 1999 they had already provided over half a million customer premises DS1 fiber terminations and nearly 100,000 customer premises DS3 fiber terminations. (*Id.*, Table 2.2). By 2003, as reported in their ARMIS data, the number of DS1 fiber terminations

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[4] For example, see Corning Cable Systems ALTOS® Ribbon Cables Specifications, All-Dielectric, 864 fiber count. In fact increasing the fiber strand count from 288 to 864 increases the cable diameter by only

tripled again (to 1.7 million) and the number of DS3 fiber terminations more than doubled (265,000).[5]

11. The very close proximity of the Bells' fiber to the points that facilities-based competitors need to connect means that the Bells have a huge competitive advantage in serving medium to large enterprise customer locations that derives directly from their status as the dominant suppliers of local service. Unlike mass-market customers, these enterprise customers (i) have individual service requirements that cross a broad spectrum– local and long distance, voice and data, telecom and advanced, (ii) purchase service under term contracts, (iii) sales to these customers are made one at a time and (iv) these customers typically possess substantial bargaining power.

12. Thus, as the Commission has recognized, there will be severe short run asymmetries between the incumbent and a competitor that make it very difficult, if not impossible in many instances, for new entrant competitive carriers to deploy bypass transmission facilities.

13. The evidence already before the Commission demonstrates that a competitive carrier almost never has in place all of the facilities it will need to respond to an enterprise customer's requirements. As explained in my initial declaration, AT&T's facilities only extend to a trivial percentage of customer locations, and

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0.15 inches.

[5] *See* rows 482 and 484 of the Bell's 2003 ARMIS submissions.

usually those facilities are limited to "fiber to the floor" arrangements.[6] Fea-Giovannucci Dec. ¶ 44. Thus, in nearly all cases requiring additional construction, AT&T must determine what additional facilities it needs and then price its retail offer at a level that enables it to recover its long run incremental costs for that construction – provided its incremental costs are also close to that of its primary competitor.

14. The Bells, however, are not in the same situation because of their first-mover advantage. Most – and typically all – of the Bells' network costs to serve enterprise customers have already been sunk. That means that the Bells' short run incremental costs to serve an enterprise customer – especially at a DS1 or DS3 level for which UNEs are available – are typically *zero*. And even when a Bell must incur *some* additional costs to serve the customer, its incremental costs are virtually always much less than competitors' costs. This provides the Bells with huge cost advantages they can use to threaten credibly to decrease prices in the short run, which deters entry altogether. *Triennial Review Order* ¶ 74, 80, 88.

15. Thus, it is easily seen that the pre-existence of an extensive fiber network that was widely deployed under the protection of a monopoly franchise creates nearly insurmountable impairment for new entrants, especially at the low capacity limits being considered here. The Bells have correctly noted that construction of a new loop or transport facility is an incremental decision. However, they utterly fail to recognize that they face a far different incremental cost equation than competitive

[6] Adding riser cable in a fiber-to-the-floor building is also a non-trivial investment. Incremental costs of $15,000 are not unusual.

carriers. All new *competitive* construction, whether to provide "loop" or "dedicated transport" functionality,[7] represents an incremental cost to the competitive carrier. But because virtually all Bell wire centers – and a very high percentage of the largest customer locations in Bell territories – are already connected by their pre-existing fiber, a Bell can usually serve existing, and often incremental, demand at extremely low short run incremental cost, and it can also add any necessary additional capacity at a much lower incremental cost than its competitors.

16. Although both the incumbent and competitive carriers deploy the same types of equipment and fiber outside plant, and therefore face similar unit costs when the same additional investments are required, competitors face a fundamentally higher incremental cost of capacity – primarily because they do not have a pre-existing fiber network of wide coverage that was justified for, and funded by, an enormous captive base of customers. Said in simple terms, competitors almost always require incremental outside plant investment while incumbents rarely do.

17. In the case of loops, when a competitive carrier approaches an enterprise customer, the incumbent will almost always be serving the customer either directly (through retail services) or indirectly, through special access connections provided to an interexchange carrier that in turn provides retail service to the

[7] Because competitive facilities are typically deployed to provide connectivity between an end user customer and the competitor's network, the use of the term "dedicated transport" is itself misleading. Incumbents use interoffice "transport" for the purpose of *completing* calls between customer locations served by different ILEC offices. In sharp contrast, competitors use those same facilities to provide a "loop" functionality, *i.e.*, to bring traffic from a customer location to a competitive carrier's switch or service node before a call is even processed.

customer. Because the incumbent is *already* serving the customer's premises with an optical facility, it either has an incremental cost of zero (if the competitor is seeking to win existing demand) or near zero if the customer is committing new demand that cannot be provided over the incumbent's existing capacity. But even in this latter case, the incumbent generally does need to invest in anything more than a new plug-in card (or possibly two, if protection is provided) at each end of the fiber facility.

18. All major equipment manufacturers, including Lucent, Cisco, and Ciena, offer very compact multiplexers that generally allow multiple common unit[8] shelves to fit into a single seven-foot frame. The common units for each of these multiplexers support multiple plug-in cards of varying capacity, from multiple OC3s or OC12s to an individual OC48. These multiplexers interface with dense wave division multiplexing ("DWDM") backplanes. Capacities allowing up to 64 wavelengths – or 64 separate transmission systems – on a single group of four single mode fiber strands are not uncommon.

19. A new plug-in card generally costs less than $10,000 and more commonly no more than $5,000. In a simple two-node ring, an upgrade requires at least two new cards, one at each end, but a carrier would more likely deploy four cards (two at each end) to assure a "hot spare" card exists to protect against service failure. As a result, the incumbent can add *a full OC48 of capacity* – twenty-four times the equivalent capacity available as a loop UNE and four times the equivalent

[8] Common unit equipment provides the interface between the optical conductor and the individual line cards. It also provides automatic switching in the event of line or card failure.

capacity available as a transport UNE – for an investment of only $20K to $40K. Little installation or engineering costs are involved and only minimal OSS update time is required. Accordingly, in most cases, the incremental investment (if any is needed at all) is $417 to $833 per DS3. Converting this investment to a monthly cost,[9] the incumbent's cost for adding this enormous amount of capacity to its existing facilities is only about $8.50 to $17 per DS3 per month.[10]

20. On the other hand, the new entrant's investment for a lateral includes the same $20,000 to $40,000 investment that the incumbent might – infrequently – need to deploy, but it must *also* deploy the two optical multiplexer common unit shelves in which the cards will be deployed (approximately $13K at each end or $26K total) and new outside plant for the lateral extending from the competitor's metro ring access point to the building. The outside plant can easily represent an investment of $25 to $75 per foot, especially in urban areas. As a result, 500 feet of newly installed fiber at installation costs in the middle of the above range is an investment of $25,000. Thus, the new entrant's cost of constructing a loop to serve a new customer in a new building is easily in the range of $91,000

[9] Assuming a 0.2444 Annual Cost Factor that incorporates annual maintenance at 2% of gross investment.

[10] In the unlikely case that the incumbent has no space left on its existing common units for additional cards, it would add capacity by lighting dark fiber. The incremental cost of such an addition is for new optical muxes that are attached at each end of the fiber strand. The cost of an optical multiplexer, including common equipment and plug-in cards for a single OC48 system (with back-up cards), peripheral equipment (frames, cross-connects panels, cables), engineering, installation and shipping/taxes is generally about $25,000 or less for each end. Thus, the cost for a system is about $50,000 for a two- node ring. Using the same assumptions discussed above, such an investment converts to a monthly cost of about $21 per DS3. And even if the incumbent had no dark fiber, it could create a subtending ring by inserting new higher capacity multiplexers on the active fibers. In current generation equipment, all this can be done by first changing out the "hot" spare card; then the active card and be accomplished under software control without service disruption. Even with older equipment, the transition can be made by changing cross-connections at the fiber distribution panel and be effectuated without service disruption. This option also represents an incremental investment of in the range discussed immediately above.

compared to the incumbent's zero incremental investment (in most cases) or an investment *less than half* that of the competitor's in the minority of cases where additional line cards might be required. And the situation is dramatically worse for new entrants if longer lengths of new outside plant are required. For example, at 1,000 feet, the incumbent will generally face an incremental investment (if any is required at all) that is only about *one-third* of the new entrant's.

21. And this disadvantage for new entrants is even greater than what may be immediately evident from these simple comparisons. The new entrant recognizes that when it deploys this sunk plant, it must recover its incremental costs within the span of a typical customer contract – generally three years. If it fails to do so, then it will be at risk of having to write off the unrecovered investment at the end of the period, either because it has lost the business or because it had to price down to match the incumbent's incremental cost – which remains zero or negligible compared to the competitor's costs.

22. As a result, new entrants seeking to serve a building cannot expect to be able to construct their own laterals to reach the building unless the customers who have signed contracts in the building will commit to significant revenues over a multi-year term. As shown in the prior declaration of Messrs. D'Apolito and –Stanley, the revenues from only 2 DS3s of service are virtually never sufficient to cover these costs.

23. These disadvantages similarly apply to interoffice transport, but the cost gap between incumbents and competitors widens for two main reasons (1) the

incremental outside plant required for transport is typically many miles and (2) the incumbent has a greater opportunity to fill the transport facility than does a competitor. As a result, there is virtually no likelihood that a competitor will construct facilities to connect two ILEC wire centers for the primary purpose of providing traffic between those offices, either at retail or wholesale. Rather, a competitor's ability to support new transport construction is limited to facilities that extend short distances – much less than the typical distance between ILEC wire centers – and connect its *backbone network* to traffic aggregation points at selected ILEC wire centers. The following example explains the competitors' dilemma and their competitive disadvantage vis-à-vis incumbents if they actually attempted to duplicate ILEC dedicated transport.

24. If only a few additional DS3s of capacity are required, the incumbent will frequently accommodate the incremental demand at *no* incremental cost simply by increasing its fill level on an existing facility. For example, increasing the fill from 76% to 85% on an OC48 system adds 4 DS3s at zero incremental cost. But even if the incumbent has a higher utilization on its interoffice transport, it will generally only need to add plug-in cards – again an investment of only $20,000 to $40,000 – to achieve an *incremental OC48* of capacity.

25. In contrast, a new entrant attempting to deploy a new dedicated transport route between ILEC offices that are five miles apart (a typical distance) must (i) establish a collocation at each end of the route (requiring investment of at least

$100,000 per end, a total of $200,000)[11], (ii) deploy an optical multiplexer with 2 OC48 cards (one "hot" and one spare) at each end ($33,000 per end or $66,000 total), and (iii) deploy diversely routed outside plant which represents an investment of at least $1.6 million.[12] Thus, the incremental cost of the transport route capacity – at an OC48 level, four times the capacity that may be purchased as a UNE – is $1.85 million for the new entrant, compared to $40,000 for the incumbent – a 46-fold advantage.

26. And the incumbent's advantage does not end here. Because it may also use the incremental capacity for its own purposes (in addition to the potential UNE requirements of the new entrant), it can expect to achieve fills that are superior to those of the new entrant. For example, if the new entrant requires only 12 DS3s between the two wire centers, its fill will be only 25%. On the other hand, the incumbent can likely achieve fills approaching 80%. Thus, the incumbent possesses a three-fold fill advantage. In combination the 46-fold incremental investment advantage and the three-fold fill advantage yields a *138-fold* unit cost advantage for the incumbent. There can be little doubt that there is no likelihood that no competitor would – or rationally could -- build its own facilities to provide transport in the face of such realities.

27. As a result, it can be seen that a competitive carrier would virtually never be able to overcome such disadvantages for the primary purpose of providing a retail or

[11] Note that this comparison does not include the monthly costs of collocation which can also be significant

[12] Two wire centers that are five airline miles apart are typically six route miles distant. If a diverse path is required and both paths can route directly (*i.e.*, there are no intervening obstacles requiring major re-

wholesale service between two such points – especially at the DS1 or DS3 levels. Rather, competitors' ability to construct new facilities is limited to their ability to build extensions that connect splice points on their existing backbone fiber to other nearby points – typically fiber-based collocations that are used to "hub" traffic from multiple ILEC LSOs. Moreover, since the selection of "hub" points on a competitive network is unique to the requirements of an individual carrier (*see* Fea-Giovannucci Dec. ¶ 15 & n.4), the mere fact that one carrier has built a fiber collocation in a particular ILEC wire center does not imply that another competitor would construct a fiber collocation there as well.

28. Accordingly, it can be seen that opportunities for competitive transport provisioning cannot possibly be predicted based solely on the number of lines (of any type) at a particular ILEC wire center. Moreover, given the costs and operational difficulties AT&T and other carriers have identified that are associated with connecting facilities-based collocations and establishing wholesaling operations (*see, e.g.,* Fea-Giovannucci Dec.), wholesaling cannot be presumed even by a carrier that has two fiber based collocations in a local area. Indeed, AT&T does not wholesale dedicated transport between ILEC wire centers, particularly at the DS1 and DS3 levels, anywhere in the country.

29. Because the incumbents' enjoy such enormous first-mover, natural monopoly advantages relative to competitors, the Commission should ensure that they are not allowed to use these advantages to establish long-term dominance of the

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routing), at least 12 miles of outside plant is required. This is an investment easily in the range of $1.58 to $4.75 million.

enterprise market. The incumbents' monopoly advantages create severe economic strains on new entrants with respect to both high capacity loops and transport – impediments that increase as the distance between the two points that must be connected increases and/or as the difference in the comparative unit investment increases. As a result, if new entrants are to be able to compete, in most instances, they must be able to rely on UNE loops, UNE transport and EELs (at the identified capacity limits) to connect customers to their networks.

30. Because of the natural monopoly characteristics of transmission facilities, competitive carriers generally cannot economically construct their own high capacity facilities, except in exceptional situations where they require only a very short length of OSP or their construction costs are extraordinarily inexpensive and their volumes are extremely high – such as when they need only a short lateral to extend to an intensive telecommunications user's premises, or a very high capacity entrance facility is required.

31. Any action that further reduces competitor's access to UNE loop, UNE transport or EELs at the identified capacity limits would simply ignore the incumbents' clear monopoly advantages. Forcing competitors to compete using only much higher priced special access services would exacerbate competitors' disadvantages, and allow the ILECs to determine where and to what extent competition will exist, because they will have an unfettered ability to act on their strong incentives to impose crippling price squeezes on competitors. Access to unbundled elements at TELRIC rates is also critical as a protection against the incumbent's ability to use its enormous short-run cost advantages to deter entry.

Similarly, the Commission must also ensure that the incumbents do not abuse their short-run advantages in other ways – for example, the Commission should be especially vigilant to guard against anticompetitive targeted winback schemes, in which incumbents could fully exploit these short-run advantages by radically reducing their retail rates in the short-run or offer other compensating incentives that reflect the incumbents' short-run monopoly advantage.

VERIFICATION

I declare under penalty of perjury that the foregoing is true and correct.

October 18, 2004.

/s/ Anthony Fea
Anthony Fea