Can other spectrum be used to offer close substitutes to service at 37-40 GHz? The characteristics of service offered at different frequencies certainly may not be identical. Frequency affects both propagation characteristics and the design (and thus perhaps the cost) of transmitting and receiving equipment. For example, the maximum length of a radio link decreases as frequency increases. Currently, service at 37-40 GHz is generally limited to hops of less than 5 miles. Service at 18 GHz or 23 GHz can be used for hops of about 12 or 15 miles. That very well may mean that service at 37-40 GHz would not be a good substitute for service at 18 GHz for, say, hops of 10 miles.[28] Since service at 18 GHz can provide shorter as well as longer hops, however, it could be in the same product market as service at 37-40 GHz. That is, users of the 37-40 GHz spectrum could likely switch to the use of the 18 GHz band if a hypothetical monopolist raised the price of 37-40 GHz spectrum.

The effects of frequency are less likely to make services dissimilar that are supplied using bands that are relatively nearby. There is substantial spectrum either in or near the millimeter wave band that is or may be allocated to fixed point-to-point service. These spectrum bands are strong candidates for being able to support service closely substitutable for service at 37-40 GHz. Specifically, the following spectrum is allocated to fixed point-to-point service and available for licensing:

- 2 GHz in the 18 GHz band (17.7 - 19.7 GHz); and
- 2.4 GHz in the 23 GHz band (21.2 GHz to 23.6 GHz).

There also is other nearby spectrum that the Commission has proposed to make available in ongoing proceedings, and that presumably will be available in the relatively near future:

- 1 GHz for LMDS in the 28 GHz band (27.5-28.35 GHz and 29.1-29.25 GHz);

---

[28] If for some reason suppliers could not change prices for longer-hop service without also changing prices for shorter-hop service, the substitution possibility for shorter-hop service could still constrain prices for longer-hop service.

- 2.8 GHz for Licensed Millimeter Wave Service (40.5-42.5 GHz and 47.4-48.2 GHz).[29]

Service in these bands should be considered in the same product market unless the technical differences are so significant that they prevent licensees from offering services at similar cost that are good substitutes for many customers.

Evidence we have seen suggests these bands could support substitutes. As noted above, current proposals for LMDS service at 28 GHz include services very similar to those WinStar offers or plans to offer in the 37-40 GHz band. The 2 GHz of spectrum at 40.5 to 42.5 GHz are nearly adjacent to the 37-40 GHz band, suggesting minimal differences due to wavelength. The millimeter radio equipment used by WinStar is designed with interchangeable frequency converters to allow it to be used at different radio frequencies through the millimeter wave band. Frequency converters are now available that allow the equipment to operate at 23, 38, and 50 GHz, which spans nearly the entire frequency range that we have suggested could be used for substitutable services.[30] This suggests both that similar services can be offered through this range, and that equipment costs for the service would be similar.

In evaluating the impact of any technical differences, it should be kept in mind that services do not have to be either identical or very close substitutes for *all* consumers to be in the same market. They only need be sufficiently good substitutes that *enough* customers would switch to prevent a price increase from being profitable for a hypothetical monopolist of 37-40

---

[29] As already noted, the Commission has proposed modifying the licenses of CMRS licensees to permit them to offer wireless local loop and other fixed services. Because this possibility is not reflected in our analysis below, our calculations will tend to overstate market concentration. Similarly, the Commission also proposes making spectrum above 70 GHz available for LMWS, but, in keeping with our focus on spectrum "relatively close" to the 37 and 39 GHz bands, we do not consider the possibility that it too would support service in the same product market, amplifying the overstatement of market concentration.

[30] Robertson Stephens & Company, "P-Com, Inc: A Pure Play On High Growth Wireless Infrastructure Markets," June 20, 1995.

GHz service.[31] Consumers who consider the services close substitutes and would switch because of a small increase in price thus protect from price increases other consumers for whom the services are not such close substitutes.[32]

The next issue is whether spectrum in a different band should not be counted as a source of substitutable service, even though technically it could support substitutable services, because there are higher-valued uses for that spectrum. Service in another band should not be excluded from the product market because *some* portion of that band is devoted to another service that arguably is higher-valued. So long as the spectrum is not *fully* utilized with higher-valued uses, some capacity can be made available for substitute service without displacing a higher-valued use, and this capacity should be counted as available to supply the product market in which 37-40 GHz service is supplied.[33] The spectrum would be unavailable to supply a substitute only if it were so fully utilized for higher-valued services that using it to provide a substitute would require shifting the spectrum from a higher- to a lower-valued-use.[34]

---

[31] Consider the following hypothetical example of a price increase that would not be profitable. Initially 100 units of a product are sold at a price of $1 Now assume that a hypothetical monopolist raises price by 5% to $1.05. Some but far from all consumers now switch to another product and sales fall to 85 units. Revenue declines by $10.75 from $100 to $89.25. Total costs also fall because fewer units need to be produced; assume that costs fall by $9.00 (saved costs of $0.60/unit times 15 units). The net effect of the price increase is to reduce profits by $1.25 (a revenue loss of $10.75 minus the $9 cost saving).

[32] This of course only works if the price must be increased to both groups of consumers, because the hypothetical monopolist cannot identify and set different prices for the consumers who do and do not consider the services close substitutes. See the discussion above concerning how price discrimination affects market definition.

[33] In other words, the issue is whether there is spectrum available that does not have too high an opportunity cost, because it must be diverted from a higher-valued use. As this discussion implies, the spectrum demand for higher-valued uses also may limit the quantity of spectrum available to supply a product market. This point is considered below in our discussion of market shares and concentration.

[34] It is not apparent that the "capacity diversion" discussion in the text is relevant in a comparison of the competitive effects of alternative spectrum caps. If there is competition among license holders of 37-40 GHz spectrum, then the prices charged for the use of that spectrum will be competitive. Given the competing demands for spectrum use, it may be that some services that use this spectrum may be offered in a market with little or no competition. The competitive problem in these "downstream" markets (i.e., markets in which spectrum is used with

Based on the evidence we have seen, it does not appear that higher-valued use would prevent the spectrum identified above from supplying substitutes for service at 37-40 GHz. Our understanding is that there is sufficient unlicensed spectrum in the 18 and 23 GHz bands to allow a substantial increase in service; this spectrum would not have to be bid from another, existing use to provide a substitute.[35] The unlicensed spectrum for LMDS at 28 GHz and for LMWS above 40 GHz obviously is not already occupied by higher-valued service. Services that could substitute for those offered with 37-40 GHz spectrum are among those proposed or predicted for this spectrum. Unless these predictions are wrong, and the new spectrum will be used to capacity in the near future, higher-valued use will not preclude the use of these bands for substitutes for 37-40 GHz service.

*Absence of Indirect Constraints of Other FCC Rules*

The third condition for broadening the product market to encompass other spectrum bands is that FCC technical or licensing rules do not indirectly prevent the supply of substitutable service, or make its supply too costly. Above we discussed direct limitations on services that could be offered. Even if license conditions do not directly prevent spectrum from being used for a particular service, other rules might constrain the characteristics or cost of services, thereby making them poor substitutes for service at 37-40 GHz. For example, the channel plan could limit the channel capacity that can be supplied to a customer, technical rules on emission limits or antennas could constrain the service that can be supplied or increase equipment cost, and licensing arrangements might increase or decrease transactions costs of acquiring licenses and providing service.

---

other inputs to provide a service to consumers) is not lack of competition in the supply of 37-40 GHz spectrum. The performance of the downstream markets may be the result of (for example) too little spectrum being allocated for these uses or to scale economies that are large relative to the demand for the service. A more restrictive spectrum cap would not mitigate these downstream problems.

[35] Links are licensed individually in the 18 and 23 GHz bands; the effects of this are considered below.

While we have not exhaustively analyzed the effects of all of the established and proposed rules, we are unaware of rules that would prevent licensees in these other bands from providing substitutes for 37-40 GHz service. Under the rules and proposed rules for the 37-40 GHz band, paired channel blocks of 50 MHz would be licensed without restrictions on how licensees subdivide their blocks. The channel plan for 18 GHz establishes channels of varying bandwidth, ranging from 2 MHz to 220 MHz. We understand that the 23 GHz band also has 50 MHz channels. No specific channel plans have been proposed for the 28 GHz or above 40 GHz bands, and it appears the Commission proposes to give licensees flexibility. Thus, channel plans for these bands would not appear to prevent licensees from offering service competitive with 37-40 GHz licensees.

Licensing rules for the 18 and 23 GHz bands do differ from those established or proposed for the other bands under discussion. In these two bands, licenses are granted for specific links, rather than licensing unlimited use of specified frequencies throughout a service area. We understand that the process of frequency coordination and applying for a license may take as much as 90 or 100 days. It is not clear, however, that any resulting differentiation is sufficiently important for enough customers that these services could not substitute for and constrain the pricing of service at 37-40 GHz.

### 3. *Non-Spectrum-Based Alternatives*

Dedicated circuits were provided over copper cable long before microwave transmission was widely used, and circuits continue to be provided without use of spectrum. They continue to be supplied over copper, and, now, over fiber optic cable. Indeed, with the high quality, abundance, and low cost of fiber optic capacity, a decreasing proportion of all circuits relies on spectrum use. Recent NTIA studies have pointed out that the number of fixed licenses in the non-Government bands above 1 GHz (excluding the 13 GHz CARS band) has been stable or

declining in recent years.[36] In contrast, and as an explanation of this pattern, NTIA points to the rapid growth in capacity provided by optical fiber, and especially the rapid growth of capacity installed by LECs. NTIA calculates that "the amount of new communications capacity (in terms of D-3 kilometers) added in optical fiber in 1991 was about 23 times the capacity added with microwave systems."[37] This suggests broad substitutability between spectrum-based microwave service and service provided over fiber. Non-spectrum-based service, provided over fiber optic or copper cable, should be included in the same product market as 37-40 GHz service unless there is reason to believe that landline service over fiber or copper is less substitutable for the specific services likely to be offered at 37-40 GHz.[38]

Service at 37-40 GHz is limited primarily to relatively short hops of up to 5 miles.[39] Thus, service at 37-40 GHz is most likely to supply demands for relatively short, "local" circuits. Although fiber circuits are suited for very long distances, unlike 37-40 GHz service, they are widely used for shorter distances as well. In particular, local exchange carriers have been deploying fiber capacity rapidly over the last several years. The FCC reports that the total fiber-miles deployed by local operating companies increased 18 percent in 1994 alone, and totaled more than 8.9 million miles by the end of the year. This is 3.9 times the fiber-miles deployed by local operating companies at the end of 1989.[40] Some of this capacity is used for

---

[36] NTIA, *U.S. National Spectrum Requirements: Projections and Trends*, NTIA Special Publication 94-31, March 1995.

[37] NTIA, *ibid.*, pp. 67-68.

[38] The discussion below concentrates on service over fiber cable. At the same time, copper plant is essentially ubiquitous in local areas, and there has been considerable work on new technological developments that increase the capacity and quality of circuits that use copper cable. Thus, copper plant, as well as fiber, is a potential source of substitutable service, and this possibility very well may increase with technological development.

[39] Longer circuits may be created by using intermediate transceivers to connect multiple links, although this increases costs.

[40] Jonathan M. Kraushaar, "Fiber Deployment Update - End of Year 1994," FCC, July 1995, Table 6.

intermediate, intraLATA circuits, but much of it also is used for short-haul traffic. In most major markets local fiber capacity also has been deployed by one or more CAPs.[41] Others, including cable television systems and utilities, also have deployed or are planning to deploy fiber capacity able to supply dedicated circuit service in local areas. The fourteen CAPs (or "Urban Fiber Systems") surveyed by the FCC had deployed a total of just under 429,000 fiber-miles by the end of 1994, an increase in deployment since 1993 of 77 percent.[42] These facts suggest that fiber increasingly is deployed where it can be and is being used to provide relatively short-haul circuits.

Transmission quality and reliability are other important service dimensions that could affect the substitutability of fiber and 37-40 GHz service. What affects substitutability, however, are similarities or differences in the service offered over each medium, not differences in the technical characteristics of cable transmissions and radio transmission. Both wireless and cable-based providers adapt their equipment and network design to the technical characteristics of their transmission medium in order to improve the quality of service provided.[43] The resulting services are not necessarily completely identical and undifferentiated, but they do not need to be to compete in the same market.

We are unaware of evidence that suggests fiber and wireless services are so dissimilar that fiber service does not and will not act as a competitive constraint on the pricing of spectrum-based service in general and of service in the 37-40 GHz band in particular. We understand that

---

[41] Kraushaar, "Fiber Deployment Update - End of Year 1994," lists at pp. 41-43 the many cities that CAPs report serving.

[42] Kraushaar, *ibid.*, Table 14.

[43] For example, transmissions over cable are vulnerable to physical damage to the cable, or so-called "back hoe fade." In response, providers use ring architectures and various monitoring devices to minimize the impact of these technical characteristics on service quality. Radio transmissions can be affected by weather or atmospheric conditions. We understand WinStar uses equipment that automatically adjusts transmitted power and adapts the siting of receiving and transmitting equipment to offset these propagation characteristics and maintain service quality.

WinStar claims transmission quality for its 37-40 GHz service similar to that over fiber, and indeed, WinStar markets its service as "Wireless Fiber," emphasizing its similarity to fiber service. Furthermore, WinStar's experience marketing its service provides direct evidence that service at 37-40 GHz must compete with service over fiber or other cable plant. We understand from discussions with WinStar that in the great majority of cases it competes directly with LEC and/or CAP services when it markets its service to potential customers. In a large proportion of cases, potential customers choose LEC or CAP service over WinStar's 39 GHz service. We further understand that WinStar directly considers the prices of LEC service when determining the pricing of its own service. This information indicates that 37-40 GHz service competes directly with the non-spectrum-based services of LECs and CAPs, and that those services constrain WinStar's pricing of 39 GHz service.

To be good substitutes services usually must be similar in cost as well as in quality.[44] Fiber and spectrum-based services have somewhat different cost structures, which could affect the appropriate product market definition. The cost of laying the fiber optic cable itself is a substantial part of the cost of fiber service, particularly in urban areas. This cost varies with distance, but varies less with capacity. Fiber with more strands and capacity can be laid with little change in cost.[45] This means that over a wide range the cost per unit of capacity of service drops as the total quantity of capacity in use on a route increases. The cost of spectrum-based circuits is much less lumpy; capacity is installed in smaller increments of capacity, and additional increments may be added at additional cost. As a result, the cost per unit of capacity may be lower for spectrum-based service than for fiber service in applications where total capacity used

---

[44] In particular circumstances, two products of different cost and quality may be sufficiently good substitutes to be in the same product market if many consumers place similar value on the quality difference. A higher-quality product A, priced 15% above product B, may nonetheless be in the same product market if many consumers would switch from product B to product A in the event of an increase in B's price that reduced the price differential.

[45] Other costs of fiber service, including the electronics, do vary more with capacity in use.

over a given route is small. Fiber service may be costly relative to spectrum-based alternatives if the costs of laying the fiber must be spread over total use that is low relative to "normal" loadings for fiber.

Thus, there may be particular customer applications for which fiber service would be quite costly compared to spectrum-based service, such as 37-40 GHz service. The question is whether a set of such customer applications constitute a separate product market from which fiber service should be excluded because it is not a good substitute. The set of such applications may be rapidly diminishing. Service over fiber to an individual customer with relatively low total demand will not be costly if the same fiber can be used to serve other customers who share the "lumpy" costs. Furthermore, fiber is being deployed rapidly in urban areas and its use is expanding rapidly. As total use increases, and fiber systems are located closer to more and more customers, the number of "lightly-loaded" uses in isolated locations will shrink. This question of whether a hypothetical monopolist of 37-40 GHz and other spectrum-based service could identify and raise prices to customers for whom fiber costs are high is part of the exercise of determining whether fiber and spectrum-based services are in the same product market. Even if they are not, because price discrimination is possible in this hypothetical, competition among actual suppliers to such a spectrum-only product market would prevent discriminatory prices.

#### *4. Summary - Product Market Definition*

Judging from early uses of the 39 GHz portion of the band, an important use of the 37-40 GHz band will be to provide dedicated circuit services. The analysis above has identified many possible sources of supply for dedicated circuit services similar to and substitutable for such service offered with 37-40 GHz spectrum. These potential substitutes include service by licensees in the 18 GHz and 23 GHz bands, by licensees for proposed LMDS service in the 28 GHz band, and by licensees in the 40.5 - 42.5 GHz and 47.4 - 48.2 GHz bands that the Commission is proposing to open for service. These bands appear particularly likely to support service that is similar to and substitutable for service at 37-40 GHz, although other spectrum

allocated to fixed point-to-point service also might support substitutes. Fiber optic cable installed by LECs, CAPs, and others, as well as the existing copper cable plant are other likely sources of similar and substitutable services.

The analysis above lays out the conditions under which the product market should be expanded to include one or more of these apparent substitutes. If these conditions are satisfied for any of these services, service at 37-40 GHz is not a distinct product market. The evidence we have reviewed indicates that most if not all of these services should be included in the same product market as 37-40 GHz service. Based on this evidence, we think it is quite unlikely that service at 37-40 GHz constitutes a distinct product market.

As noted at the beginning of this section, uncertainty about the nature and cost of service to be offered at 37-40 GHz, and about some of the possible substitutes, makes definitive conclusions about the relevant product market difficult. Some of this uncertainty comes from uncertainty about the impact of technological development. In particular, service at 37-40 GHz, as well as at 28 GHz and the bands above 40 GHz, is quite new, and further development can be expected to reduce the cost and extend the capabilities of service at these bands. Other developments may extend the capabilities, or increase the capacity to offer service at more established bands, over fiber cable or over copper. Technological development often expands the appropriate product market as suppliers look to increase the range of services they can provide, and thus increase the range of substitutes available in the market.[46]

### 5. *Geographic Market*

The Commission has proposed that the service areas for new licenses in the 37-40 GHz band should be Basic Trading Areas. If in each BTA all suppliers of service in the same product market also supplied service throughout the BTA, and only in that BTA, then geographic market

---

[46] See, for example, "A Copper-Plated Full Service Network," Telephony (January 15, 1996), pp. 20-26.

definition would be straightforward. Consumers throughout the BTA could choose from among the same alternatives, and all suppliers would face the same competition throughout the area they served.

Suppliers to the relevant product market probably do not all supply the same service area, and in principle this makes geographic market definition more complicated. On the one hand, if some competing suppliers serve only part of the BTA, the appropriate geographic market might be smaller than a BTA to take account of the varying number of supply alternatives available to consumers in different parts of the BTA. On the other hand, if some competing suppliers serve areas larger than the BTA, the appropriate geographic market may be larger if the pricing of suppliers with larger service areas is constrained by the competition they face in the larger area. Where competitors serve differing areas, the appropriate geographic market depends heavily on the ability of suppliers to price-discriminate and charge different prices to consumers located in different parts of their service area.

If all suppliers to the relevant product market can discriminate and set different prices in narrow geographic areas, then each narrow geographic area generally would constitute a distinct geographic market. If the number and shares of competitors differ from one area to another, antitrust analysis considers the level of concentration (along with other competitive factors) in each such area, since in principle suppliers' ability to exercise market power could vary among these narrow areas.

If, however, some suppliers serving broad areas cannot price-discriminate, then in many cases this will broaden the relevant geographic market. Firms that serve broader areas then have to raise price not only in some narrow area where they may face a limited set of competitors, but also in their broader service area. Increased profits from a (hypothetical) price increase by all

firms serving the narrow area are offset, and quite possibly outweighed, by lost profits in the broader area where they face other competitors who do not increase price.[47]

As mentioned, new licenses in the 37-40 GHz band would be for BTA service areas under the proposed rules, although existing licenses in the 37-40 GHz band are for rectangular areas. The Commission also has proposed BTA service areas for LMDS service licenses in the 28 GHz band. Larger, MTA service areas, however, have been proposed for LMWS in the above 40 GHz bands. In the 18 GHz and 23 GHz bands individual links are licensed, and thus licensing rules permit "service areas" to be larger or smaller than BTAs. Finally, the service areas of LECs will not generally be coincident with BTAs; LEC service areas often extend across BTA boundaries, but more than one LEC may serve a particular BTA. Different suppliers also may have differing abilities to price-discriminate among the areas they serve. All things considered, it is difficult to reach general conclusions on the appropriate geographic market, and whether it is larger or smaller than BTA regions for which new 37-40 GHz licenses would be offered.

For purposes of our analysis of concentration, we make provisional use of a BTA geographic market. Calculations based on this geographic market will not understate concentration so long as all suppliers counted in this market can serve the entire BTA. Under existing or proposed rules, firms supplying the spectrum-based substitutes we have considered could serve an entire BTA.[48] Some LECs will provide service throughout a BTA.[49] Such

---

[47]In defining geographic markets, one assumes that the price is raised in the provisional market (here the narrow area), but that prices in the surrounding area remain the same. Thus, the prices of other suppliers in the broader area would be assumed to remain constant when evaluating the profitability of the price increase.

[48] Nothing would preclude a firm from applying for licenses at 18 GHz or 23 GHz anywhere in a BTA. In the other bands, service areas would be at least as large as a BTA.

[49] The LEC may not have fiber capacity throughout a BTA. A LEC presumably could supply dedicated circuits throughout a BTA over other installed plant, although the technical characteristics of the service may vary.

measures of concentration, however, could overstate concentration if some suppliers serve larger areas within which they cannot discriminate.[50]

## D. Antitrust Analysis of the Number of Firms, Market Shares, and Concentration

The number of firms, the shares they hold, and measured concentration are key features of market structure. Generally, economists believe that the larger the number of firms, and the lower their individual market shares, the more likely competition will prevail (all else equal). Conversely, as the number of firms declines and their shares increase, the likelihood increases that the firms may be able, either individually or as a group, to raise prices above competitive levels. Thus, mergers and acquisitions, because they typically increase individual shares and measured concentration, are closely scrutinized to determine whether a specific transaction poses a material threat of reducing competition and allowing prices to increase.

There is, however, no simple, hard-and-fast rule concerning whether a merger in a market with a particular level of industry concentration (short of a merger to monopoly) will lead to noncompetitive outcomes. The ability of a group of firms to raise prices is materially affected by many factors in addition to market structure. Because these factors influence how competition works in specific markets, concentration is only one factor, albeit an important one, in evaluating the effect of mergers and acquisitions. We here review the Merger Guidelines' classification of market structure and concentration, and then discuss the applicability of these standards to the issue of spectrum caps rather than mergers.

---

[50] To reduce the Commission's administrative costs and to permit the realization of efficiencies, WinStar has proposed that the service areas for 37-40 GHz licenses be MTAs rather than BTAs. If the Commission were to adopt MTA license areas, the direction of any resulting change in appropriate geographic market definition would be to expand the size of the geographic market. Expanding the geographic market would in turn be likely to increase the number of suppliers and reduce concentration. As a result, the discussion below of concentration in spectrum-only markets, which is based on a smaller BTA geographic market, may overstate the likely degree of market concentration.

### 1. *Merger Guidelines' Standards*

The 1992 Merger Guidelines reflect current standards adopted both by the Federal Trade Commission and the Antitrust Division of the Department of Justice for evaluating mergers and acquisitions. The Guidelines use the Herfindahl-Hirschman Index (HHI) to measure market concentration. The HHI is calculated by summing the squares of the individual market shares of all market participants. For example, in a market with 10 firms, each of which had a market share of 10 percent, the HHI would be 1000.[51] A market consisting of seven firms, with two firms having shares of 25 percent each and the remaining five firms having shares of 10 percent each, has an HHI of 1750.[52] The HHI for a monopoly is 10,000. The Guidelines identify different criteria in evaluating mergers, depending on the level of concentration (as measured by the HHI) that prevails after the transaction.

> Post-Merger HHI Below 1000. Market is unconcentrated. Mergers are unlikely to have adverse competitive effects. No further analysis is required.
>
> Post-Merger HHI Between 1000 and 1800. Market is moderately concentrated. Mergers that produce an increase in the HHI of less than 100 points are unlikely to have adverse competitive effects. No further analysis is required. Mergers that produce an increase in the HHI of more than 100 points may raise competitive concerns depending on factors set forth elsewhere in the Guidelines and discussed below.
>
> Post-Merger HHI Above 1800. Market is highly concentrated. Mergers that produce an increase in the HHI of less than 50 points are unlikely to have adverse competitive effects. No further analysis is required. Mergers that produce an increase in the HHI of more than 50 points may raise competitive concerns depending on factors set forth elsewhere in the Guidelines. Mergers that produce an increase in the HHI of more than 100 points are presumed to enhance market power or facilitate its exercise. However,

---

[51]Each firm's share of 10% would be squared (10 x 10=100), and the resulting numbers added together. In this case, each of the 10 firms' contribution to the HHI is 100; the HHI itself, therefore, is 1000.

[52]Each of the two firms with 25 percent contributes 625 to the HHI (25 x 25 = 625), and the remaining five firms contribute 100 each (10 x 10 = 100); the HHI totals 1750.

> this presumption may be overcome by a showing that factors enumerated elsewhere in the Guidelines make such exercise of market power unlikely.[53]

The Guidelines also state that, in some circumstances, a merger that results in a firm with a market share of 35 percent or more may confer on that firm the ability unilaterally to raise prices.[54]

As discussed in more detail later (see section F), the key factors in addition to concentration to which the Guidelines direct attention include conditions that facilitate or inhibit collusion or cooperation among firms, e.g., the ability to detect and punish a firm's deviation from a collusive agreement; the possibility of expansion by existing firms; and entry by new competitors. Broadly, the focus is on the ease or difficulty of collusion among existing firms, and on the ability of existing firms to expand, or new firms to enter the market, to undercut or defeat any attempt to raise prices to consumers to noncompetitive levels.[55]

This summary of the market structure standard enunciated by the Merger Guidelines permits several important observations. The numerical HHI standard that is applied to evaluate whether or not a transaction threatens to harm competition is not a single number, but varies depending on market circumstances. In moderately concentrated markets (HHI between 1000 and 1800), only transactions that increase the HHI by more than 100 points require further

---

[53]Merger Guidelines, ¶ 1.51.

[54]Merger Guidelines, ¶ 2.22. The Merger Guidelines leave open the possibility that mergers that otherwise might be challenged may be allowed if the transaction is necessary to achieve otherwise unattainable efficiencies. See ¶ 4.

[55]Merger Guidelines, ¶¶ 2 and 3. Franklin M. Fisher ("Horizontal Mergers: Triage and Treatment," Journal of Economic Perspectives, 1, 23-40 [Fall 1987], p. 31) observes that "while the HHI seems a reasonable way to measure concentration, neither theory nor reliable econometric evidence shows that the HHI is a sufficient statistic for determining the effects of concentration on noncompetitive behavior." Elsewhere ("Diagnosing Monopoly," Quarterly Review of Economics and Business, 19 [Summer 1979], reprinted in Industrial Organization, Economics, and the Law, John Monz (ed.), Cambridge, MA: MIT Press, 1991, p. 15) Fisher observes that "...the one proposition which most people believe is that a small share shows the absence of monopoly power and a large share its presence....This is not true. The right question is that of what happens to share...when monopoly profits are sought. The fundamental question is whether competitors are able to grow."

analysis, and, even if the increase is significantly greater than 100, reflecting a "large" increase in concentration, the acquisition may still not be viewed as harmful to competition. While the standard for evaluating increases in concentration becomes more stringent when the post-merger HHI is above 1800, even in such cases there is a presumption that small increases in concentration (HHI change of less than 50) will not harm competition. Moreover, transactions involving quite large increases in concentration (HHI change exceeding 100) may be permitted if certain other factors are present.

Finally, the standard for evaluating when a single firm's share raises competitive concerns is quite high - 35 percent. Thus, a merger that results in a single firm share of less than 35 percent (so long as it does not run afoul of the overall HHI standards) is not treated as anticompetitive.

The 1992 Merger Guidelines incorporate revised standards from those that had been issued in the 1980s.[56] The 1992 Guidelines relaxed certain portions of the merger standards, particularly by reducing reliance on market shares and concentration measures alone. For example, in describing enforcement policy for mergers raising concentration by more than 100 points in moderately concentrated markets (post-merger HHI between 1000 and 1800), the 1984 Guidelines had stated that the Antitrust Division "is likely to challenge mergers in this region" unless the Department concluded on the basis of other factors that the merger was not likely substantially to lessen competition. In the 1992 Guidelines, the language concerning the likelihood of legal challenge was deleted, and the concern moderated to state that such transactions "raise significant competitive concerns" depending on other factors set forth in the Guidelines.

---

[56]The first Merger Guidelines were issued by the Department of Justice in 1968. Guidelines incorporating a substantially different framework and set of standards were issued in 1982. At about the same time (in 1982), the Federal Trade Commission issued its own "Statement Concerning Horizontal Merger Guidelines." The DOJ revised its Guidelines in 1984. The joint 1992 Guidelines thus reflect a revision of the 1982 and 1984 documents.

Similarly, when evaluating highly concentrated markets (post-merger HHI above 1800), the 1984 Guidelines stated that mergers that increased the HHI by more than 100 points were likely to be challenged because, "only in extraordinary cases will such [other] factors establish that the merger is not likely substantially to lessen competition." By 1992, the standard had been modified to reflect the belief that if a post-merger HHI exceeded 1800 and the change was greater than 100, there was a presumption that the transaction was "... likely to create or enhance market power or facilitate its exercise." Even in this case, however, the Guidelines stated that this presumption could be overcome by a showing that other factors made the exercise of market power unlikely.

The changes in language between 1984 and 1992 reflected the actual enforcement standards being applied. Few cases were brought during the 1980s that attempted to prevent or enjoin mergers in markets with post-merger HHIs below 1800, regardless of the change in the HHI. In fact, an analysis of the cases actually filed by the FTC and Antitrust Division found that complaints were seldom brought in markets where the post-merger HHI was in a range of 2000 to 2100. For example, in 1989 an American Bar Association Task Force wrote:

> The question remains, however, whether the 1984 Merger Guidelines accurately present the [Antitrust] Division's enforcement policy as applied to actual cases. ... The Division has brought very few cases in which the HHI levels for the post-merger industry were between 1000 and 1800 although the 1984 Guidelines indicate that in this range the Department "is likely to challenge" a merger that increases the HHI by 100 points or more, absent countervailing factors. Similarly, it appears that a significant number of mergers with HHIs in excess of 1800 and HHI increases above 100 have not been challenged, despite the 1984 Guidelines' assertion that such mergers lack anticompetitive effects "only in extraordinary cases." The resulting public perception is that the Division may be pursuing an enforcement policy more lenient than the 1984 Guidelines dictate...[57]

Similarly, in commenting on the 1984 Guidelines, the then-Acting Assistant Attorney General for Antitrust, Charles James, stated:

---

[57]"Report of the ABA Antitrust Law Section Task Force on the Antitrust Division of the U.S. Department of Justice," Antitrust Law Journal, Vol. 58, Issue 3, p. 760 (footnotes omitted).

> ... the concentration standards [in the 1984 Guidelines] did not reflect enforcement practice. In fact, the agencies challenged only very few mergers in moderately concentrated markets and only some of the mergers in markets that were highly concentrated.[58]

The failure of the antitrust agencies strictly to enforce the 1984 Guidelines, in which the standards were based heavily on concentration screens, reflected two practical considerations. First, in reviewing mergers for enforcement action, the agencies routinely considered, and gave substantial weight to, factors other than concentration and market shares. Thus, a wide variety of factors, several of which were subsequently incorporated into the 1992 Guidelines, played major roles in the screening process, and influenced the agencies in their exercise of discretion in case selection.

Second, in the 1980s, in ruling on merger actions brought by the antitrust authorities, the courts gave substantial weight to factors other than concentration. Indeed, a significant number of cases brought by the government were rejected, with the courts pointing to factors in addition to market shares and concentration. For example, in one important Circuit Court decision (*United States v. Baker Hughes Inc.*), the Court wrote:

> Imposing a heavy burden of production on a defendant would be particularly anomalous where, as here, it is easy to establish a prima facie case. The government, after all, can carry its initial burden of production simply by presenting market concentration statistics. To allow the government virtually to rest its case at that point, leaving the defendant to prove the core of the dispute, would grossly inflate the role of statistics in actions brought under Section 7 [of the Clayton Act]. The Herfindahl-Hirschman Index cannot guarantee litigation victories....Requiring a "clear showing" in this setting would move far toward forcing the defendant to rebut a probability with a certainty.[59]

---

[58]Charles A. James, "Overview of the 1992 Horizontal Merger Guidelines," Antitrust Law Journal, Vol. 61, Issue 2, p. 449. See also Janet L. McDavid, "The 1992 Horizontal Merger Guidelines: A Practitioner's View of Key Issues in Defending a Merger," Antitrust Law Journal, Vol. 61, Issue 2, ftn. 9, p. 461.

[59]*United States v. Baker Hughes Inc.*, 908 F.2d 992 (D.C. Cir. 1990). In the *Baker* case, in the market for hardrock hydraulic underground drilling rigs, the HHI increased by 1425 points, from 2872 to 4303. The Court pointed to such factors as easy entry by foreign firms and the sophistication of buyers as conditions mitigating concern based on HHI numbers.

Similarly, in *United States v. Syufy Enters.*, despite a merger to monopoly for a short period in the distribution of first-run movies in Las Vegas, the Court wrote:

> Time after time, we have recognized this basic fact of economic life: A high market share, though it may raise an inference of monopoly power, will not do so in a market with low entry barriers or other evidence of a defendant's inability to control prices or exclude competitors.[60]

As this discussion reflects, in antitrust enforcement matters involving changes in market structure, the antitrust authorities, in exercising prosecutorial discretion, and the courts, in actually enforcing the law, have both relaxed the concentration and share standards that may have been applied in the past, and moved away from very heavy reliance on market share and concentration measures. Instead, they have applied what is appropriately viewed as a "rule of reason" analysis that incorporates many factors other than market share that are important to the competitive process in specific industries.

### 2. *Application of Merger Guidelines' Standards to Spectrum Caps*

A rule of reason approach, rather than mechanical application of Merger Guidelines' standards, is particularly appropriate in fashioning a licensing policy for the 37-40 GHz spectrum. In the first place, as noted earlier, a restrictive policy is likely to result either in the failure to offer some services that may be more valuable than those currently offered or in some of the spectrum remaining fallow. In the second place, the context is different.

The paradigm in the Merger Guidelines is useful and convenient for assessing the competitive effects of alternative spectrum caps, but the precise HHI thresholds, entry tests, and

---

[60] *United States v. Syufy Enters.* 903 F.2d 659 (9th Cir. 1990). In *Syufy*, the Court cited with approval *Hunt-Wesson Foods, Inc. v. Ragu Foods, Inc.*, 627 F.2d 919, 924 (9th Cir. 1980), cert. denied, 450 U.S. 921, 101 S.Ct 1369, 67 L.Ed. 348 (1981): "Blind reliance upon market share, divorced from commercial reality, [can] give a misleading picture of a firm's actual ability to control prices or exclude competition." Similarly, in *United States v. Country Lakes Foods, Inc.*, 754 F Supp. 669 (D. Minn. 1990), the Court rejected the Department of Justice case seeking to enjoin a merger between fluid milk producers in Minneapolis, despite the fact that the HHI rose from 2186 to 2832. The Court pointed to the ease of entry and expansion, the presence of powerful buyers, and efficiencies that would be created by the transactior

other criteria that trigger an enforcement action are too stringent for evaluating "appropriate" spectrum caps. In the context of a merger, the issue addressed is whether a *change* in ownership will significantly raise the likelihood of anticompetitive behavior in some particular market. The Guidelines paradigm should not be and is not mechanically applied to a more concentrated industry structure that evolves because successful firms expand internally and less successful firms contract. The strict applicability of the Guidelines to mergers alone can be viewed as a result of a concern that wider applicability would deter efficient internal growth and thereby dampen "competition on the merits." Firms would be deterred from experimenting with new marketing techniques, new production technologies, and even with new services for fear of becoming "too" successful. By artificially discouraging such experimentation through a mechanical application of the Guidelines, the Commission would harm consumers because better ways of serving them would be less likely to be uncovered. If a firm did find a (say) lower-cost way of producing a service, the mechanical application of the Guidelines would discourage that firm from growing, thereby denying consumers the benefits of the lower costs. This is consistent with distinctions that antitrust law and policy make among the sources of firm dimensions. Firms that grow internally to become "dominant" in highly concentrated markets do not violate the antitrust laws simply because of their growth.

The Justice Department itself has acknowledged explicitly that the Guidelines' thresholds of anticompetitive concern should be less stringent in a non-merger environment. For example, in considering whether crude oil pipelines should be deregulated, the Department specifically eschewed the HHI criteria in the Guidelines and was prepared to recommend deregulation for markets in which the HHI was as high as 2500, far in excess of the 1800 threshold in merger analysis.[61]

---

[61] *Oil Pipeline Deregulation*, U.S. Department of Justice, Antitrust Division (May 1986), p. 30.

Of particular relevance here is the fact that the Commission is awarding 37-40 GHz spectrum to provide an as-yet ill-defined array of services. As a result, the efficient industry structure for providing those services cannot now be predicted. Indeed, one rationale for permitting licensees flexibility in choosing what services to provide is that the Commission does not and cannot know the service mix that will prove most valuable to end-users. That flexibility permits licensees to experiment in order to determine that service mix.

A similar rationale exists for permitting a less rather than more constraining spectrum cap than might be suggested by a mechanical application of the Guidelines. The Commission does not and cannot know the mixture of scale and scope economies that will result in the lowest-cost provision of the still-unknown service array. In more mature markets, the history of services provided and of production configurations employed by incumbent firms enables the antitrust authorities to more accurately evaluate efficiency claims in merger and monopolization cases. This, in turn, reduces the risk that antitrust actions will unduly threaten the development of an efficient industry structure. No such history exists for 37-40 GHz services to permit the Commission to conclude with any confidence that a lower rather than a higher spectrum cap will carry little risk of discouraging efficiency. In the face of this uncertainty, the corresponding possibility that a low spectrum cap will discourage efficient firm growth and experimentation is greater here than in a traditional merger review. Consequently, in determining the magnitude of the spectrum cap, the Commission should consider permitting significantly more relaxed thresholds than those used in the Guidelines.

## E. Structural Analysis of the Markets in Which 37 to 40 GHz Services Will Be Supplied

### *1. Capacity and Market Shares*

The first steps in measuring concentration are to identify the firms that can supply the appropriate product and geographic market, and then to assign each firm a market share. A firm's market share may be measured either as its share of sales or its share of capacity. The Merger Guidelines specify that share should be measured in whatever way best reflects the

"future competitive significance" of the firms.[62] In this case, we believe capacity is an appropriate measure of firm share, and the bandwidth that could be devoted to supply service in the product market is an appropriate way to measure capacity (at least for spectrum-based service).[63] There are two reasons for this.

First and most pragmatically, meaningful sales data are unavailable for 37-40 GHz service and for much other spectrum-based service likely to be in the same product market. All of the 37 GHz portion of this band, and much of the 39 GHz portion, remains unlicensed, so there can be no data on the sales of firms that receive these licenses. Licenses also are still to be awarded in the 28 GHz and above 40 GHz bands. Much of the capacity in the 18 GHz and 23 GHz that could be devoted to service in the product market also would come from links that have not been licensed.

Second, capacity and bandwidth will be a good measure of a firm's competitive significance if that indicates the level of output and sales the firm could supply rapidly were other firms to try to exercise market power by raising price.

Note, however, that the premise of a cap is that the concentration of spectrum control directly affects market structure and the level of competition in the supply of downstream services. This need not be the case. A firm licensed for less bandwidth might develop a superior service and become larger, while the growth of firms with more bandwidth is constrained by their inability to serve consumers as well. In that case, however, the spectrum licenses do not determine downstream market structures, and the extent of concentration resulting from factors other than control of spectrum provides little guidance for a policy of

---

[62] Merger Guidelines, ¶1.41.

[63] More precisely, a firm's market share would depend both on the bandwidth it controlled and the proportion of the geographic market (appropriately measured) in which it controlled that spectrum. In what follows we simplify the analysis by assuming that all firms serve the entire geographic market, and therefore it is not necessary to consider this additional factor.

constraining the distribution of spectrum. In other words, in determining the stringency of the spectrum cap, the Commission should focus on policies that promote the competitive availability of spectrum and not on the variety of possible market structures that may or may not emerge in downstream markets for reasons that have little or nothing to do with the competitive supply of spectrum. For this purpose, it is appropriate to calculate concentration based on spectrum "capacity."

Two other issues remain before market shares and concentration can be measured. First, what is the relationship between bandwidth and capacity, and is it the same across the different bands that may be used to produce service in the product market? For example, does a firm with a license to 200 MHz in the 37-40 GHz band have half the capacity to supply services in the product market of a firm with a license to 400 MHz of spectrum in the 28 GHz or above 40 GHz bands? A precise answer depends on such matters as the technical conditions that determine the extent of frequency reuse and the choice of technology that determines how much information can be carried per unit of bandwidth.[64] Our understanding, however, is that assuming capacity is directly proportional to bandwidth is a reasonable first approximation. The calculations of concentration presented below assume that firms' share of bandwidth equals their share of capacity.

The second issue is how much of the spectrum in various bands should be counted as "in the product market," where a spectrum band is used to produce a range of different services, not all of which are in the same product market as services at 37-40 GHz. The capacity that should be counted in the market is not just the capacity currently used to produce services in the product market, but capacity that could and would be used in the event of a small price increase.[65]

---

[64] Changes in the technology or equipment used also may increase the capacity of service that can be supplied per unit of spectrum.

[65] The Guidelines note that "[i]f a firm has existing assets that likely would be shifted or extended into production and sale of the relevant product within one year, and without incurring significant sunk costs of entry and exit, in

Bandwidth that currently is not used to produce services outside the product market also should be counted. In addition, bandwidth should be counted that could and would be switched quickly and at low cost from other uses.[66]

### 2. *Market Structure and Concentration*

The analysis above concluded that it is very unlikely that service at 37-40 GHz constitutes a distinct product market. The analysis identified both other spectrum and non-spectrum-based technology and suppliers that are likely candidates for supplying similar services, and concluded that some if not all of them likely supply the same product market. This section analyzes the resulting structure and concentration of the market in which 37-40 GHz services are supplied under different definitions of the product market. It also analyzes the necessity for a spectrum cap to prevent excessive concentration under the different market definitions. The Commission has requested comment on preventing a single firm from acquiring licenses to more than 6 paired 50 MHz channels, or 600 MHz, in the 37-40 GHz bands.[67] The analysis here indicates that limit is not necessary to prevent excessive concentration and preserve competitive market structures.

We first analyze market structure if wireline or cable capacity, as well as spectrum-based capacity, is included in the product market. Next we analyze market structure if the product market includes only spectrum-based capacity. The analysis of spectrum-only markets presents illustrative HHI calculations for different product market definitions and different levels of a spectrum cap for the 37-40 GHz band.

---

response to a 'small but significant and nontransitory' increase in price for the relevant product, the Agency will treat that firm as a market participant." ¶ 1.321.

[66] See the earlier discussion on supply-side substitution and "uncommitted entry."

[67] Under the Commission proposal, a firm also could acquire up to 2 licenses for unpaired 50 MHz channels, bringing the total spectrum that could be licensed to 700 MHz. The analysis here considers only licenses to the 28 paired channels, and caps on the acquisition of these licenses, since it is not clear whether services supplied with the unpaired channels should be considered in the same product market.

*Product Market Includes Non-Spectrum-Based Capacity*

The 37-40 GHz band would account for only a relatively small proportion of total capacity in a product market that included services of LECs, CAPs, and others that do not rely on spectrum to supply dedicated circuit services. It would be difficult to construct comparable measures of spectrum and non-spectrum-based capacity in order to measure market shares, and that has not been attempted here. We have already noted the great capacity of the fiber and other plant that LECs have installed and continue to install as well as the substantial capacity that CAPs and others have installed in many areas.

A product market that includes this cable-based capacity may not be unconcentrated, but if not it would be because LECs retain very large shares. Capacity at 37-40 GHz would constitute only a very small share of any product market that included the wireline capacity for short-haul circuits of LECs, CAPs, and others. Limiting the 37-40 GHz spectrum for which a firm could acquire licenses would affect only a very small portion of total market supply and could have no substantial impact on overall market structure. Therefore, such a cap should have no substantial impact on market performance and competition. The cap would merely control the number and size of firms that use one of several means of supplying service in the product market, and that constitute only a small subset of suppliers to the product market. Competition concerns provide no rationale for controlling the structure of such a small subset of a relevant product and geographic market.

*Product Market Includes Only Spectrum-Based Capacity*

Even a product market that includes only spectrum-based capacity would be relatively unconcentrated. We have prepared illustrative HHI calculations to show the structural concentration in such a product market. Tables 1 - 7 containing these calculations are in an appendix to this paper.

The analysis above identified spectrum in the 18 GHz, 23 GHz, 28 GHz, and above 40 GHz bands as particularly likely to support service in the same product market as service offered