

for loading of existing facilities, it is reasonable to conclude that COMSAT does not have market power. However, the market share of service from existing facilities is not the only measure of the presence of effective competition. This study also considers six other factors which provide evidence of market structure and market performance that is relevant for assessing effective competition from existing facilities:<sup>25</sup>

1. *Evidence on the growth of alternative facilities and the availability of idle capacity:* Growth of alternative facilities and the availability of substantial amounts of idle capacity owned by COMSAT's competitors provide evidence that alternative suppliers could readily enter or expand service at little additional cost in a relatively short period of time if COMSAT attempted to raise prices above a competitive level;
2. *A comparison of the relative costs of satellite and cable technology:* If cable technology is capable of providing comparable services for comparable costs, COMSAT will face effective competition from fiber optic cables;
3. *Sophistication and bargaining power of customers:* If COMSAT's customers are sophisticated buyers with large volumes of traffic, they will have sufficient leverage and knowledge of alternatives to ensure competitive pricing;
4. *Absence of geographic rate differentiation:*<sup>26</sup> If COMSAT charges similar or identical prices regardless of the remoteness of the location of the user, competitive pressures in one geographic area will tend to proliferate to all geographic areas;
5. *Competitive rate trends:* Evidence of COMSAT cutting rates in response to the marketplace is evidence of effective competition; and

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<sup>25</sup> In its *Interexchange Marketplace* decision, the FCC determined that AT&T lacked market power in the business services segment of its retail telecommunication services. In doing so, the FCC relied on studies indicating that AT&T's market share for business services was declining and could be as low as 50 percent. However, the FCC confirmed that "market share trends derive from a variety of factors and are not dispositive themselves of whether market power exists." 6 FCC Rcd at 5890 n. 91. The list of indicia of effective competition employed in this study is similar to that used in the *Interchange Marketplace* decision.

<sup>26</sup> Of course, geographic rate differences exist in competitive markets and regulators may force geographic rate grouping that would not occur in a competitive market. This indicator is therefore useful only for the limited purpose stated above.

6. *Proliferation of services:* Evidence of COMSAT offering innovative pricing and services in response to the marketplace is evidence of effective competition.

As shown in more detail below, my analysis of these six factors shows in every case that COMSAT faces effective competition from existing facilities. Even if COMSAT faced little competition from existing facilities, however, competition from planned facilities and the threat of entry would further act to constrain market power sufficiently to justify a finding of effective competition.

### *Competition from Planned Facilities*

As the FCC has recognized, even a substantial market share (*i.e.*, calculated with traffic data for existing facilities) is not incompatible with a highly competitive market.<sup>27</sup> Market power could be constrained by competitive alternatives that currently have no share of the market segment, yet effectively limit the firm's power over price. An important example is where incumbents such as COMSAT face effective competition from planned facilities that have not yet gone into service. Capacity on these facilities is usually acquired on the basis of long-term contracts. An entrant currently attempting to pre-subscribe capacity on a planned new facility could exert considerable competitive pressure on incumbents' pricing policies even though the new facility's share of the current market segment is zero.

Evidence of the effectiveness of competition from planned facilities is seen in each of the six previously mentioned factors that are relevant to competition from existing facilities. The magnitude of investments already scheduled for completion provides evidence of effective competition as well.

The effect of previous entry on market share also provides relevant evidence. This effect is often evidenced by a pattern over time that shows a high share for incumbents, followed by a precipitous drop after new entry occurs. But price competition is initiated even before entry occurs, as incumbents and the owner of the planned facility compete for the business prior to

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<sup>27</sup> See *Interexchange Marketplace*, 6 FCC Red at 5880.

entry. Market shares of the incumbents prior to entry are not evidence of market power, because price competition does not wait for planned facilities to go into service.

### *Competition from the Threat of Entry*

Of course, new entry does not have to be imminent to constrain an incumbent's market power. Incumbent firms will limit prices if they believe that supracompetitive prices will attract entry. This possibility is well recognized by most methods for assessing market power, including the DOJ/FTC Guidelines.<sup>28</sup>

Competition from the threat of entry will be particularly effective if entry is easy. The probability of new entry is very high in business segments showing significant growth. In this case, the new entrant can achieve success without the need to take all its traffic volume from the incumbent.

Evidence of the effect of the threat of entry comes in the form of historical and current data on successful entry in these markets plus evidence that COMSAT is responding to competitive pressure from the six factors cited above.

## **CHOICE OF MARKET SEGMENTS TO ASSESS THE PRESENCE OF EFFECTIVE COMPETITION**

### *Method for Partitioning COMSAT's Services and Geographic Service Areas into Market Segments*

COMSAT's services and geographic areas have been disaggregated into market segments for purpose of analyzing the presence of effective competition.<sup>29</sup> The objective of this disaggregation is to define the segments so that they are relatively homogenous with regard to

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<sup>28</sup> See *Merger Guidelines*:

. . .the Agency assesses whether entry would be timely, likely and sufficient either to deter or to counteract the competitive effects of concern. (*Merger Guidelines* §0.2.)

<sup>29</sup> See Chapter IV.

available demand and supply substitutes in each market segment. This procedure ensures that the lack of effective competition for some buyers would not be obscured by lumping them together with other buyers who do enjoy effective competition.

### *Conservatism of the Approach*

The approach in this study is conservative in the sense that its assumptions are the least favorable for COMSAT. The analysis determines the level of competition for each service and geographic market segment. Thus, if COMSAT faces effective competition in the service segments and geographic areas considered here, the finding of effective competition will hold for any combinations of the market segments examined. If the regulated firm cannot exercise market power in any of the market segments in which it competes, it certainly cannot exercise market power in any "larger," more aggregated market segments.

### III. THE THREE DIMENSIONS OF COMPETITION

This chapter elaborates on the three dimensions of competition described above that COMSAT faces from trans-oceanic cable and separate satellite systems:

- competition for the loading of existing facilities;
- competition for pre-subscription of planned facilities; and
- competition from the threat of entry.

Current market shares are often used to measure effective competition in industries that operate exclusively in "spot" markets.<sup>30</sup> However, in this industry the full extent of effective competition is *not* indicated by current market shares alone because sales take place through long-term commitments. Each of the three competitive dimensions for trans-oceanic facilities-based telecommunications services constrains market power.

#### COMPETITION TO COMSAT FROM EXISTING FACILITIES

COMSAT began to face significant competition in the late 1980s with the installation of trans-oceanic fiber optic cables and the launch of separate satellite systems. Today, a number of existing facilities provide trans-oceanic telecommunications capacity that competes with COMSAT. Five trans-Atlantic, four trans-Pacific, and two trans-Caribbean fiber optic cable systems have been installed and are currently operating.<sup>31</sup> In addition, several separate satellite systems operators (*e.g.*, PanAmSat, Columbia Communications, Hispasat, and Intersputnik) already have facilities in orbit to provide trans-oceanic services to and from the U.S.<sup>32</sup>

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<sup>30</sup> "Spot" markets are markets for immediate delivery of the good or service as opposed to future periods under long-term contracts or ownership.

<sup>31</sup> The cables are TAT-8, PTAT-1, TAT-9, TAT-10, TAT-11, HAW-4/TPC-3, NPC, TPC-4, HAW-5/PACRIM-East, PTAT-1/CARAC, and TCS-1; *See* Exhibit HSH-10.3.

<sup>32</sup> *See* Exhibit HSH-10.2.

Currently, vast amounts of idle capacity are available on existing trans-oceanic fiber optic cables. Technological developments such as digital transmission and compression techniques have also increased the effective capacity of these facilities.<sup>33</sup> The extent of competition from *existing* satellite and cable systems can be determined with currently available market share and idle capacity data.

COMSAT's major USISC customers own and operate the majority of trans-oceanic fiber optic cable systems to and from the U.S. Once a USISC has sunk costs by purchasing capacity on trans-oceanic fiber optic cables, it will prefer to use the cable systems as long as there is idle capacity. The variable costs of utilizing carrier-owned idle capacity on the cables are small compared to the cost of increasing leased capacity from third parties (such as COMSAT). Consequently, USISCs have a strong incentive to utilize their own systems and are unlikely to switch to competing facilities as long as idle capacity is available on their own facilities. If it were not for considerations of routing diversity and existing commitments to long-term contracts, carriers would have to be offered sufficient incentives to keep even existing traffic on competing third-party facilities.<sup>34</sup> This is a powerful constraint on the ability of COMSAT to obtain any market power.

Market shares and idle capacity measured in terms of *existing* facilities will understate the true extent of competition. Competition exists *prior* to the in-service dates of alternative facilities when these facilities compete for customer commitments for future trans-oceanic telecommunications capacity. COMSAT's current market share does not reveal that competitors have won business when customers enter pre-subscription commitments. By the time pre-subscribed facilities become available, subscribers have already committed themselves and alternative facilities no longer actively compete for the traffic that will be placed on these facilities.

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<sup>33</sup> With the use of "digital circuit multiplication equipment" (DCME), carriers can derive up to five digital "voice-equivalent" circuits from the capacity traditionally needed for one analog voice circuit.

<sup>34</sup> This incentive is illustrated by the fact that average digital compression rates on COMSAT significantly exceed average compression on cable systems. In 1993, for example, AT&T's average compression rate was 2.6 on COMSAT compared to an average compression rate of 1.9 on cables. (See Exhibit HSH-3).

## COMPETITION TO COMSAT FROM PLANNED FACILITIES

Competition from planned<sup>35</sup> facilities is a significant competitive force in the provision of trans-oceanic facilities-based telecommunication services. If COMSAT's rates are not competitive with these other options, a higher fraction of planned facilities offered by competitors will be pre-subscribed.

Fast growth in the trans-oceanic telecommunications market and carriers' desire for routing diversification and cable-based backup service have led to the rapid addition of new facilities. A great number of trans-oceanic telecommunications facilities are currently planned or already under construction. These facilities offer a variety of new routing options and provide new interconnection and additional capacity to various countries and regions.

In contrast to the retail telecommunications industry, the standard practice in the facilities-based telecommunications services market today is for carriers to sign *long-term contracts* for capacity on fiber-optic cable and separate satellite systems. While COMSAT once offered capacity only on a monthly basis, COMSAT now offers satellite circuit leases at lower rates in return for a *long-term commitment*.

Long-term contracts limit the degree to which a company with a high market share measured in terms of existing facility utilization could exercise market power in the short and intermediate term. Rates charged to customers with existing fixed-price, long-term contracts cannot be increased for the contracted capacity when the contract is in force. Thus, in the absence of effective competition a facilities-based provider with market power could only increase contract prices for incremental demand or for expiring leases.

Pre-subscription of capacity on planned facilities is a significant force in the competition for market growth and the renewal of expiring long-term contracts. The high costs of trans-oceanic telecommunication facilities and planning horizons of several years necessitate pre-subscription of available capacity years before the facilities become available. Construction of a new facility

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<sup>35</sup> As used in this document, facilities referred to as *planned* facilities have been authorized by the FCC (and/or are already under construction) and will come on line by the end of 1996.

typically will start only after a significant fraction of its available capacity is contracted in advance. For example, construction of fiber optic cables typically does not begin until the pre-subscribed (or "notional") capacity exceeds 50 percent of a cable's design capacity.<sup>36</sup>

Similar practices exist in contracting for capacity on separate satellite systems.<sup>37</sup> Indeed, PanAmSat noted in its SEC filing that half of its available future satellite capacity would be subscribed on a pre-launch basis.<sup>38</sup> The *Wall Street Journal* reported that PanAmSat has already negotiated pre-launch agreements totaling \$958 million with international television programmers for the long-term lease of capacity on three new satellites.<sup>39</sup> In short, COMSAT is *now* competing with separate satellite systems for pre-subscription of services in both the Atlantic and Pacific Ocean regions. Because PanAmSat's planned satellites are already successfully pre-subscribed, COMSAT's market share is likely to drop abruptly as soon as these satellites begin operation later this year.

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<sup>36</sup> The TPC-5 fiber cable between the U.S. and Japan is not scheduled to be completed before 1996, but at the time of the application for authorization in June 1992, the cable was already over 50 percent pre-subscribed by 44 carriers in 20 different foreign locations. (See *Joint Application of AT&T, et al., for Authorization Under Section 214 of the Communications Act of 1934, as Amended, to Construct, Acquire Capacity in and Operate a High Capacity Digital Submarine Cable Network Between and Among the United States mainland, the State of Hawaii, the Island of Guam, and Japan*, FCC File No. I-T-C-92-179, filed Jun. 4, 1994). Similarly, at the time of the Columbus-2 cable application in November 1992, 66 percent (*i.e.*, 496 of 756 minimum investment units) of the cable's capacity was already subscribed although the cable will not be ready for service until the end of 1994 (See *Joint Application of AT&T, et al., for Authorization Under Section 214 of the Communications Act of 1934, as Amended, to Construct, Acquire Capacity in and Operate a High Capacity Digital Submarine Cable System Between and Among the United States Mainland, Mexico, U.S. Virgin Islands, Spain, Italy and Portugal*, FCC File No. I-T-C-93-029, filed Nov. 10, 1992.)

<sup>37</sup> For example, with respect to long-term contracting practices, PanAmSat noted in a recent SEC filing that approximately 81 percent of the available capacity on each new satellite would be reserved for long-term contracts, leaving only the remaining 19 percent available for ad hoc broadcast services and intermediate-term (*i.e.*, 3- to 5-year) business services (See PAS SEC Form S-1 at A-4).

<sup>38</sup> See PAS SEC Form S-1 at A-4.

<sup>39</sup> *Wall Street Journal*, Dec. 6, 1993 at B8.

## COMPETITION TO COMSAT FROM THE THREAT OF ENTRY

The threat of entry is also a significant competitive force in the market for trans-oceanic facilities-based telecommunication services. If COMSAT's rates were to become uncompetitive, entry would become very profitable. Competition can take place as the threat of: (1) entry by new trans-oceanic facilities; or (2) existing facilities providing services they have not provided in the past. Facilities or services still in the proposal stages would find sufficient customer commitments to make them economically feasible. Once a threshold of customer commitments is reached, the threat of entry becomes reality. Until such facilities are fully pre-subscribed, they will continue to compete actively in the market for trans-oceanic capacity.

Another important characteristic of this industry is that annual demand created through high growth is large relative to annual demand created by the turnover of existing contracts. In this environment, market entry will be facilitated because new facilities must be added frequently.

Many of the long-term commitments for capacity on competing separate satellite systems are for the useful life of the facility.<sup>40</sup> Capacity on cable systems is generally pre-subscribed through contracts that cover the useful life of a cable. The capacity is pre-subscribed either by investing in a consortium that owns the cables or by signing leases for the useful life of "private" (*i.e.*, non-common carrier) cable systems with third-party cable owners.<sup>41</sup> Thus, telecommunications traffic lost by COMSAT to competing facilities is effectively removed from the marketplace until those facilities retire.

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<sup>40</sup> See PAS SEC Form S-1 at A-5.

<sup>41</sup> Examples for private cables are the PTAT and NPC cable systems.

## IV. RELEVANT MARKET SEGMENTS

To analyze market power, this study disaggregates relevant market segments based on service characteristics and geographic regions. Identifying separate service and geographic market segments permits the investigation of the degree of effective competition in the provision of transmission capacity for specific telecommunication services to specific regions in the world.

### CABLE AND SATELLITE SERVICES ARE CLOSE SUBSTITUTES

For cable and satellite services to be part of the same market segment they need to be close substitutes. COMSAT's customers have used cable capacity successfully in place of satellite capacity to provide most types of transmission services. Facilities-based competition between cable and satellites has increased to the point that fiber optic cables now carry a steadily increasing percentage of switched voice and private line services. This migration of satellite traffic to fiber optic cables is likely to continue. Moreover, trans-oceanic cables are expected to carry video and audio services soon.<sup>42</sup>

The FCC addressed the substitutability of domestic satellite and terrestrial communications systems in 1980 and concluded that satellites and terrestrial systems "have reasonable interchangeability."<sup>43</sup> The Commission observed that competition between satellites and cable facilities was already underway and concluded that "[u]sers will, in the final analysis, choose the facility or mix of facilities which is most efficient for their individual purposes. In any event, satellite channels present no clearcut advantage which would create a separate relevant

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<sup>42</sup> The National Telecommunications and Information Administration (NTIA) has noted that TV broadcasters soon will begin to use undersea fiber optic cables as a significant medium for international program transmission. (Source: NTIA, *Globalization of the Mass Media*, Special Publication, Vol. 93-290 (January 1993) at 33-34.) Domestically, the growth of fiber optic networks has led increasing numbers of companies to choose fiber for video transmission and news gathering. See "Satellite or Fiber? The Distinctions Blur," *Satellite Communications* (June 1992) at 26-29.

<sup>43</sup> *Satellite Business Systems*, 62 FCC 2d 997, 1079-80 (1977) ("*SBS Decision*"), *aff'd sub nom. United States v. FCC*, 652 F.2d 72 (1980).

domestic satellite market."<sup>44</sup> The experience with these two transmission media since the *SBS Decision* bears out the correctness of the Commission's substitutability determination.

The FCC also recognized in 1985 that satellite and cable capacity are essentially fungible for most international uses and routes.<sup>45</sup> However, in the same decision the FCC held that COMSAT was the dominant provider of Intelsat space segment capacity and that the space segment is a relevant sub-market.<sup>46</sup> The Commission based its conclusion on: (1) the then current lack of fiber optic cables; (2) the fact that satellites were at that time the only cost effective means of transmission for digital and television services and the most cost effective medium for low density traffic paths;<sup>47</sup> and (3) the Commission's then-existing circuit loading guidelines, which guaranteed COMSAT a definite market share of switched voice traffic.<sup>48</sup>

All of this has changed dramatically since 1985. The circuit distribution guidelines are no longer in place.<sup>49</sup> Large geographic areas of the world are now served cost-effectively by fiber optic cables. With the ever expanding global fiber optic network, risk is increasingly diversified, and cable-to-cable backup increasingly takes the place of satellite-based restoration service.<sup>50</sup> The cost of fiber optic technology has dropped dramatically.<sup>51</sup> Regions not served by existing or planned fiber-optic systems account for only a small fraction of total trans-oceanic telecommunications traffic to and from the U.S. (see discussion below). And finally, separate

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<sup>44</sup> *SBS Decision*, 62 FCC 2d at 1080.

<sup>45</sup> *International Competitive Carrier*, 102 FCC 2d at 838.

<sup>46</sup> *Id.* at 822, 838.

<sup>47</sup> *Id.* 838 n. 63. Significantly, the FCC stated that this was the basis for its decision "[u]ntil fiber optic cables are introduced."

<sup>48</sup> *Id.* at 838 n. 64.

<sup>49</sup> *See Policy for the Distribution of United States International Carrier Circuits Among Available Facilities During the Post-1988 Period*, 3 FCC Rcd 2156 (1988).

<sup>50</sup> For example, PTAT-1, Trans-Gulf, Columbus-2, Americas-1, TAT-12/13, and TPC-5 are trans-oceanic cable systems with fiber-to-fiber backup.

<sup>51</sup> *See* Chapter IX for further discussion.

satellite systems are now authorized to provide all types of trans-oceanic telecommunications services in direct competition with COMSAT.<sup>52</sup>

Given all this, there is no reason to assume that cable facilities, where available, would not directly compete with satellite services.<sup>53</sup> Consequently, I conclude that satellites and fiber optic cables are close substitutes in major geographic regions world-wide and provide comparable service across a broad range of service offerings.

### SERVICE MARKET SEGMENTS

Prior FCC analyses of competition in this market assumed that trans-oceanic transmission facilities are used to provide three services: (1) public switched voice services (or international message telephone service, IMTS); (2) private line (or non-IMTS) services; and (3) video and audio services.<sup>54</sup>

However, as explained below, the reasons for the prior distinction between switched voice and private line *retail* services do not exist in the "wholesale" trans-oceanic facilities-based telecommunications market. In addition, the FCC has substantially lowered the regulatory barriers on separate satellite systems to allow them to provide a significant amount of switched voice services.<sup>55</sup> This regulatory change combined with the expansion of cable systems means that both cable and separate satellite capacity can now provide these types of services.

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<sup>52</sup> See *Permissible Services of U.S.-Licensed International Communications Satellite Systems Separate from the International Telecommunications Satellite Organization*, 9 FCC Rcd 347 (1994) ("1250 Decision").

<sup>53</sup> Of course, each transmission medium still has certain strengths and weaknesses. For example, the cost of satellite transmission is insensitive to distance and number of destination points. Satellites may therefore be the most cost-effective providers of transmission services to distant destinations or for wide-area coverage. Thus, they are often preferable for point-to-multipoint service such as broadcasting. Satellites are also very flexible (*e.g.*, new routes can be set up within hours) and do not have the problem that cable has in making the final "last mile" connection to the end user. Cable is more difficult to reconfigure but can be more economical for point-to-point transmission along high-traffic routes.

<sup>54</sup> *International Competitive Carrier*, 102 FCC 2d at 823, 828.

<sup>55</sup> See *1250 Decision*.

However, video and audio services are not yet commonly carried on trans-oceanic cable systems.

Given the competitive choices available to customers today, I conclude that trans-oceanic facilities-based telecommunications services need only be divided into two separate service market segments: (1) transmission of trans-oceanic switched voice and private line services; and (2) transmission of trans-oceanic video and audio services. However, in the interest of being conservative, this study also disaggregates the analysis where feasible to examine effective competition separately for switched voice services and private line services.

### *Switched Voice and Private Line Services*

Telecommunications end users of switched voice and private line services typically connect with an international telecommunications carrier which makes a choice between using satellite or cable transmission facilities. A satellite transmission can be initiated by connecting to a U.S. earth station for link to either COMSAT's space segment or to a separate satellite system. Earth stations providing switched voice and private line services are owned by USISCs, teleport operators, large retail customers, and separate satellite systems.<sup>56</sup>

The alternative to satellite transmission is transmission via trans-oceanic cable (fiber optic and some copper) systems. The USISCs typically connect to the landing point of a submarine cable system that provides trans-oceanic transmission service. In most cases, USISCs own and operate the trans-oceanic cable systems.<sup>57</sup>

On the receiving end, the trans-oceanic transmission facilities also link to either an earth station or a cable landing point. "Tail lines" provide transmission from the receiving cable landing points or satellite earth stations to the final destination. Because earth stations can often be

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<sup>56</sup> COMSAT World Systems, however, does not currently provide earth station service and COMSAT Corporation is only allowed to provide earth station service through subsidiaries fully separate from COMSAT World Systems. See *Earth Station Ownership Order*, 100 FCC 2d 250 (1984).

<sup>57</sup> For example, in the Atlantic Ocean Region, AT&T owns approximately two-thirds of TAT-8, approximately 50 percent of TAT-9 and approximately 30 percent of TAT-10 and TAT-11. In the Pacific Ocean Region, AT&T owns approximately two-thirds of HAW-4/TPC-3 and almost 50 percent of TPC-4. (See Exhibit HSH-10.3)

located in closer proximity to the final destination (and may even be on-site), tail lines from the coastal cable landing points of trans-oceanic fiber optic cables to the final destination tend to be longer than those required for satellite transmission. Cable service therefore may be associated with higher transit charges to countries without landing points of trans-oceanic cables.

### *Video and Audio Services*

Most of the competition for trans-oceanic video and audio service stems from separate satellite systems and, in some geographic areas, from regional and transborder domestic satellites. U.S. TV networks use earth stations (owned either by themselves, a teleport operator, or a USISC) for satellite transmission services provided by COMSAT or separate satellite systems.

Trans-oceanic video and audio services are not yet routed through cable systems. A significant fraction of video transmission is point-to-multipoint service for which satellites are particularly well suited. However, there is little doubt that fiber optic cables will become a serious competitor in the trans-oceanic transmission of video and audio signals in the near future.<sup>58</sup> There is high demand for point-to-point trans-oceanic video and audio services that stems from: (1) U.S. and foreign broadcasters' need for "backhaul" services<sup>59</sup> in the gathering of news and sports events; and (2) the fact that the multi-point video broadcast and distribution to end users are often performed by regional or domestic (rather than trans-oceanic) satellite systems. These point-to-point services currently are vulnerable to competition from fiber optic cables.

As the trans-oceanic video market matures and continues to move towards digital transmission, the overseas intra-regional fiber optic networks will reach more and more end users. Broadcasters that are currently using satellite capacity for point-to-point links between major cities in the U.S. and overseas<sup>60</sup> are likely to be already exploring the feasibility of using digital

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<sup>58</sup> Fiber optic cables already carry a significant fraction of video transmission services within the U.S., especially in the point-to-point video market. See "Satellite or Fiber? The Distinctions Blur," *Satellite Communications*, June 1992, at 26-29.

<sup>59</sup> Backhaul services are video or audio transmissions from remote locations back to the network studio.

<sup>60</sup> For example, in addition to point-to-multipoint service, PanAmSat is providing point-to-point carriage of  
(continued...)

video transmission via fiber optic cables for this purpose. In fact, some providers of fiber optic cable capacity are already actively promoting trans-oceanic video transmissions.<sup>61</sup>

## GEOGRAPHIC MARKET SEGMENTS

### *Switched Voice and Private Line Services*

The FCC found in its *International Competitive Carrier Decision* that each country is a distinct geographic market for the international retail switched voice services provided to end users by the USISCs.<sup>62</sup> However, the geographic markets for trans-oceanic facilities-based switched voice and private line services are quite different. The FCC based its decision on the fact that retail telecommunications services are only possible if a USISC has obtained the agreement of the corresponding foreign carrier. These agreements are made at the "retail" level and do not involve the "wholesale" owner of the facilities, such as fiber optic cables, whose only function is to provide "transportation" on trans-oceanic telecommunications routes.<sup>63</sup> Thus, the USISC seeking service via COMSAT or its competitors must already have secured (or expect to secure) the necessary agreements with the foreign carrier in order to complete a retail circuit. A pure "wholesale" provider will not be concerned with the retail carriers' agreements.

Trans-oceanic facilities-based telecommunication services to and from the U.S. are provided on three main routes:

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<sup>60</sup>(...continued)

TV programming across the Atlantic for distribution in Europe by regional satellite systems. See PAS SEC Form S-1 at 42.

<sup>61</sup> For example, see Vyvx and PTAT presentations, Inter-Union Satellite Operations Group (ISOG), London, April 1994 meeting. Vyvx's stated goal is to "become the international interconnect for cable and broadcast television."

<sup>62</sup> See *International Competitive Carrier*, 102 FCC 2d at 676-77. There, the FCC referred to retail telecommunications services that are only possible if a carrier has obtained the agreements of the corresponding foreign carriers.

<sup>63</sup> In the case of trans-oceanic cable systems, retail carriers usually are their own "facilities-based carriers." This, however, does not change the general conclusion.

1. Across the Atlantic to Europe, Africa, and the Middle and Near East (reaching as far as India);
2. To the Caribbean and Latin America; and
3. Across the Pacific to Asia and Oceania (*e.g.*, Australia and New Zealand).

In each of the geographic regions associated with these three main routes, COMSAT faces intramodal competition from separate satellite systems. For example, satellites deployed over the Atlantic Ocean provide North-South telecommunication links between North America and Central and South America as well as East-West links to Europe, the Middle East, Africa and all the way to India.<sup>64</sup> Satellites over the Pacific Ocean Region provide East-West links to East Asia, Oceania, and may also reach as far as India.

In addition, COMSAT faces intermodal competition from trans-oceanic cable systems on each of the three main routes. Most high-traffic regions of the world are already served through existing fiber optic cables or will be served through planned cable systems within the next few years. However, there are smaller, low-traffic areas in the geographic regions associated with these routes that are not easily accessible through the existing or planned cable systems.

In the analysis of switched and private line services, therefore, this study defines *two* geographic market segments in *each* of the *three* areas associated with the main routes: (1) a geographic market segment that faces intermodal competition from existing and planned cable systems; and (2) a geographic market segment without significant intermodal competition from existing and planned cable systems.

The market segmentation thus produces three geographic market segments with competition from existing and planned cable facilities corresponding to each of the three main routes:

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<sup>64</sup> However, individual separate satellite systems may choose to focus on specific regions such as Europe and Latin America. For example, PanAmSat currently competes vigorously for service to and from Latin America but does not yet provide service to Africa.

- *Europe/Mediterranean/Middle East;*
- *Caribbean/Latin America;* and
- *East Asia/Oceania.*

Likewise, there are three geographic market segments for the countries without easy access from existing and planned cable facilities<sup>65</sup> corresponding to each of the respective routes:

- *Rest of the Atlantic Ocean Region (Rest of AOR);*
- *Rest of Latin America;* and
- *Rest of the Pacific Ocean Region (Rest of POR).*

COMSAT is only deemed to face cable competition from existing or planned facilities if a country is already served by trans-oceanic cable systems or if it is explicitly listed as being served through planned fiber optic cables. In particular, service to a country is deemed to be currently subject to intermodal competition from existing or planned facilities if that country satisfies either one of two criteria: (1) the country *already* has significant access through cable systems,<sup>66</sup> or (2) the country will be served through fiber optic cable systems before the end of 1996.<sup>67</sup> These criteria are conservative because they exclude countries to which cable service could be instituted on existing and planned facilities, but where carriers have not elected to do so.<sup>68</sup>

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<sup>65</sup> See Exhibit HSH-1 for the classification of overseas countries and territories by geographic market segments.

<sup>66</sup> The criteria applied is that, based on the September 1993 *AT&T Circuit Report*, at least 30 percent of all circuits established to a country must be via cable systems.

<sup>67</sup> Exhibit HSH-2 shows a list of countries that, by 1996, will be served through trans-oceanic fiber optic cable systems.

<sup>68</sup> There is no definitive way to identify these countries because competition is a matter of degree and is changing over time. It is most likely that there are available but currently not activated cable routes. If COMSAT tried to increase rates, it could face effective competition from these cable routes. Also, with every new trans-oceanic or intra-regional fiber optic cable planned or constructed, intermodal competition is likely to emerge for new countries.

In contrast to satellite capacity that can be reassigned readily among countries within an ocean region,<sup>69</sup> fiber optic cable routes are fixed. As a consequence, two cables in the Atlantic Ocean Region may not be substitutes for each other. For example, a fiber optic cable linking eastern Canada and Brazil would hardly be a good substitute for a trans-Atlantic cable between the U.S. and Europe. Because there is not yet a single global fiber optic network, it may be difficult or at least expensive to route service to Latin America through cable systems going to Asia or even Europe.

However, cable systems serving one geographic market segment as defined above will be good substitutes for one another.<sup>70</sup> Two cables will always be good substitutes for each other if their landing points are in countries that are part of the intra-regional cable network.

Most countries served by trans-oceanic cables are part of highly developed intra-regional cable networks. These cable networks continue to be supplemented by new facilities. For instance, the intra-regional network in East Asia is expanding rapidly.<sup>71</sup> New intra-regional cable systems will also provide an additional link between Australia and other East Asian countries, expand the fiber optic network in Europe, and provide more intra-regional links in the Caribbean. The interconnection of countries within regions easily accessible by cable is further supplemented by regional satellite systems which include Eutelsat in Europe, PanAmSat in South America, Arabsat in the Middle East, as well as Apstar and Palapa in Asia.

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<sup>69</sup> For example, Atlantic Ocean satellites may be good substitutes for all international communications within the Atlantic Ocean Region.

<sup>70</sup> The majority of countries in the geographic market segments with intermodal competition from existing and planned facilities will be served by two or more cables by the end of 1996.

<sup>71</sup> Nine international telecommunications organizations recently agreed to begin construction of a new Asia Pacific Cable Network (APCN) that will connect Singapore, Indonesia, Malaysia, Thailand, Hong Kong, the Philippines, Taiwan, Japan, and South Korea by the end of 1996. At a cost of \$610 million, the cable system will have a capacity of 5-gigabits per second with a potential capacity equivalent to 660,000 voice circuits. The cable system will connect to other fiber optic systems in the region and provide fiber-to-fiber backup. *Telecommunications Reports International*, July 23, 1993, at 13.

### *Video and Audio Services*

Competition in facilities-based video and audio services is currently mainly among satellite systems. Although intermodal competition is emerging, I have elected to be conservative and assume only the existence of intramodal competition for this service segment. The geographic market segments are broader than those for switched voice and private line services because I did not distinguish between those areas served by cable and those that are not.

As a result, the three geographic regions used for analyzing the effective competition for video and audio services correspond to the three main routes identified above: (1) trans-Atlantic transmission ("trans-Atlantic"), (2) trans-Pacific transmission ("trans-Pacific"), and (3) transmission to the Caribbean and Latin America ("Latin America").

### CONCLUSIONS

Tables 2 and 3 summarize the geographic market segmentation for the two service market segments and the three competitive dimensions discussed in Chapter III. Section C of this study applies this structure of product and geographic market segments to analyze the level of effective competition and complete the tables below.<sup>72</sup>

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<sup>72</sup> See Tables 4 and 5 at 59 and 78.

**TABLE 2**  
**STRUCTURE OF COMPETITION IN SWITCHED VOICE AND PRIVATE LINE SERVICES**

GEOGRAPHIC SEGMENT U.S. TO:	COMPETITION FROM:		
	EXISTING FACILITIES	PLANNED FACILITIES	THREAT OF ENTRY
Europe/Mediterranean/Middle East			
Caribbean/Latin America			
East Asia/Oceania			
Rest of Atlantic Ocean Region			
Rest of Latin America			
Rest of Pacific Ocean Region			

**TABLE 3**  
**STRUCTURE OF COMPETITION IN VIDEO AND AUDIO SERVICES**

GEOGRAPHIC SEGMENT U.S. TO:	COMPETITION FROM:		
	EXISTING FACILITIES	PLANNED FACILITIES	THREAT OF ENTRY
Trans-Atlantic			
Caribbean & Latin America			
Trans-Pacific			

## V. DEFINITION AND MEASUREMENT OF MARKET SIZE AND CAPACITY

This chapter explains how the size of market segments is defined and measured in order to calculate COMSAT's market shares for the analysis in Chapters VI and VII. The chapter also describes how available capacity, used for the analysis of idle capacity in Chapter VIII, is measured. Comprehensive publicly-available statistics on trans-oceanic facilities-based telecommunications services that would ordinarily form the basis for a competitive market analysis do not exist. Consequently, this study draws upon a great number of sources to present as reasonably complete a picture as possible.

Revenue data or data on units of demand are ordinarily used to define market segments and to calculate market shares for various competitors. However, revenue data are not available for most facilities-based trans-oceanic telecommunications services. The problem is that many market participants are vertically integrated and provide various additional services that are not unbundled in terms of revenues.<sup>73</sup> For example, USISCs, the largest group of market participants, also own trans-oceanic telecommunication facilities. Although these USISCs provide price and revenue data for their retail telecommunications services to end users, they typically do not provide the associated unbundled "wholesale" prices and revenues for the trans-oceanic facilities-based part of their services.

An accepted alternative in such cases is to use the volume (or number) of market transactions. Because customers *use* (*i.e.*, lease or own) transmission capacity on trans-oceanic telecommunications facilities, the amount of *utilized* capacity is an appropriate measure of volume. The relevant unit for measuring utilized trans-oceanic capacity is a 64 kbps-equivalent

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<sup>73</sup> However, because customers of video and audio service are not vertically integrated, revenue data for trans-oceanic video and audio services could be derived.

duplex circuit.<sup>74</sup> Because the FCC does not publish data on total utilized transmission capacity, the size of all market segments must be estimated.

#### UTILIZED CAPACITY FOR SWITCHED VOICE AND PRIVATE LINE SERVICES

The analysis of switched voice and private line services that will be presented in Chapter VI required the measurement of capacity utilized for these services.<sup>75</sup> Total utilized capacity for switched voice and private line services to and from the U.S. is the sum of: (1) COMSAT utilized capacity for switched voice and private line service; (2) utilized capacity on trans-oceanic cables to and from the U.S.; and (3) utilized capacity for switched voice and private line services on separate satellite systems to and from the U.S.

COMSAT provided data on its utilized capacity from 1987 through 1993, disaggregated into switched voice and private line services as filed with the FCC. However, utilized capacity on trans-oceanic cables and separate satellite systems must be estimated. For trans-oceanic cable systems, this was accomplished with data on AT&T's utilization of its (owned and leased) share of cable facilities for switched voice and private line services. The data were available from circuit reports filed by AT&T with the FCC for the years from 1988 through 1993.<sup>76</sup>

Utilized cable capacity for switched voice and private line services to the Caribbean/Latin America, Europe/Mediterranean/Middle East, and East Asia/Oceania was estimated by assuming that the fill rate of total cable capacity to these regions equals AT&T's fill rate of its share of

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<sup>74</sup> These circuits are often called "bearer" circuits, but in this study will be referred to simply as "circuits." Customers, such as USISCs, may operate digital circuit multiplication equipment (DCME) on both sides of trans-oceanic telecommunications facilities and derive up to five voice-equivalent circuits from each bearer circuit. These circuits will be referred to as derived, or voice-equivalent circuits. Because it is up to the customer to use digital compression, this study does not use derived circuits to measure the volume of facilities-based service.

<sup>75</sup> See Exhibit HSH-5.

<sup>76</sup> See Exhibits HSH-3 and HSH-4 for a summary of these data.

capacity on these cable systems.<sup>77</sup> In order to estimate the few utilized cable circuits that exist even to the geographic market segments not easily accessible by existing and planned cables, it was assumed that all carriers use satellite and cable facilities in the same proportion as AT&T.<sup>78</sup> For the disaggregation of market shares in switched voice and private line services, this study assumes that the trends and magnitudes of COMSAT's share in AT&T's utilized capacity to the various geographic market segments are representative for the industry as a whole.

Very limited information on utilized capacity for switched voice and private line services on separate satellite systems to and from the U.S. is available today. While it is certain that separate system satellites carry switched voice and private line services to and from the U.S.,<sup>79</sup> there does not appear to exist a complete and reliable set of data. In the interest of being conservative, this study omits utilized capacity for switched voice and private line services to and from the U.S. on separate system satellites in estimating COMSAT's market share. In any case, total switched voice and private line services on separate satellite systems as of the date of this report will still be relatively small in relation to the total market.<sup>80</sup>

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<sup>77</sup> The fill rate of a cable is the number of utilized circuits divided by the cable's design capacity expressed in bearer circuits. Annual cable capacity serving geographic market segments was compiled from individual cable applications submitted for authorization by the FCC. These data are summarized in Exhibit HSH-10.

<sup>78</sup> As a result, COMSAT's market share in geographic market segments not easily accessible by existing or planned cables equals COMSAT's share of AT&T's utilized capacity to these regions. Considering that AT&T is the largest user of trans-oceanic facilities to and from the U.S., this assumption is expected to generate reasonable estimates. Because these regions are not easily accessible by cable, they will only have very few cable circuits.

<sup>79</sup> PanAmSat noted that it has established trans-oceanic switched voice circuits to and from the U.S. but identifies neither time nor destination (*See* PAS SEC Form S-1 at 44). At least 3 transponders on PanAmSat's PAS-1 satellite also carry trans-oceanic private line services to and from the U.S. (*Source*: World Satellite Transponder Report, May 1993 ed.; PR Newswire, June 6, 1993.) AT&T circuit reports for 1992 and 1993 indicated that Intersputnik provided 63 circuits to the former U.S.S.R. countries.

<sup>80</sup> The assumptions made to quantify utilized trans-oceanic capacity for switched voice and private line services may underestimate the actual size of the market. However, this would only understate the true extent of competition by *overstating* COMSAT's market shares. The total market size may be understated because: (1) trans-Atlantic, trans-Pacific, and trans-Caribbean cable fill rates of carriers other than AT&T are likely to exceed the cable fill rate of AT&T; and (2) utilized capacity for switched voice and private line services on separate satellite systems has been omitted in this study.

## UTILIZED CAPACITY AND REVENUES FOR VIDEO AND AUDIO SERVICES

For the analysis of video and audio services in Chapter VII, it was possible to estimate market size and market shares for both utilized capacity and revenues.<sup>81</sup> Historical data and projections of COMSAT facility use and revenues for video and audio services were provided by COMSAT. The video lease projections for PanAmSat were developed from traffic projections and satellite transponder assignments made publicly available by PanAmSat.<sup>82</sup> Revenues from PanAmSat video leases were calculated by multiplying the number of leases with the estimated video rates for half-circuits originating or terminating in the U.S.<sup>83</sup> Projections for video and audio leases for Orion-1 were developed based on assumptions similar to those for PanAmSat.<sup>84</sup>

Reliable estimates and projections for transponder leases on other separate satellite systems and U.S., Mexican, and Canadian domestic satellite systems could not be developed for the purpose

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<sup>81</sup> See Exhibit HSH-6. Because video and audio service is offered in more discrete bandwidth increments than private line service, it was possible to estimate the utilized capacity from COMSAT-provided data reflecting the number of video and audio leases on separate satellite systems.

<sup>82</sup> See PAS SEC Form S-1, A-1 through A-7. Recent PanAmSat press releases confirm the magnitude of these projections. For example, the *Wall Street Journal* reported on December 6, 1993, that PanAmSat has reached pre-launch agreements with TV programmers for space on its three planned satellites. These agreements already fill approximately a third of the available capacity, in line with PanAmSat's projection that about half of the planned capacity will be pre-subscribed at the time of launch. PanAmSat stated that it expects to find subscribers for the remaining capacity within 4 to 5 years.

<sup>83</sup> Each *full* circuit on a satellite is composed of two *half* circuits, one each on the sending and receiving end. This procedure is very conservative because, in contrast to COMSAT, separate satellite systems obtain revenues from the full circuit (*i.e.*, both half circuits) of a satellite transmission. For the analysis of market shares, however, this study focuses on the half circuits originating or terminating in the U.S. and, consequently, takes into account only half of the revenues that PanAmSat and Orion receive from full-circuit video and audio transponder leases.

Average rates for video and audio service on separate satellite systems were estimated to be *half* of \$1.5 million per year for each transponder lease on PanAmSat's existing PAS-1 satellite and *half* of \$2.5 million per year for each transponder lease on PanAmSat's and Orion's planned satellites. See Exhibit HSH-6.2.

<sup>84</sup> Orion has stated that it has already started to offer limited trans-Atlantic services to customers by reselling Intelsat transponders and that it will compete for trans-Atlantic video and audio service. See "W. Neil Bauer: President and Chief Executive Officer, Orion Network Systems Inc.," *Space News*, March 14-20, 1994. For transponder lease assumptions, see Exhibit HSH-6.1.

of this study. Similarly, market share projections do not include video service that may be carried on fiber optic cable systems in the near future. The extent of competition from these systems will not be reflected in the estimated market size. As a result, COMSAT's market share will be overstated.

#### TOTAL AVAILABLE CAPACITY

For the analysis of idle capacity in Chapter VIII, it is necessary to measure available capacity. The available capacity of trans-oceanic telecommunications facilities to a geographic market segment is defined to be the sum of (1) the design capacity of trans-oceanic cable systems to and from the U.S. and (2) an allocation of satellite capacity available for service to and from the U.S.<sup>85</sup>

Cable capacity to geographic market segments is defined as the number of full circuits that can be established between the U.S. and the geographic market segments served by the cable.<sup>86</sup> While this capacity usually can be reassigned to serve different countries within one geographic market segment, cable capacity typically cannot be shifted between geographic market segments. Cable capacity is, therefore, clearly associated with geographic market segments and idle cable capacity can be calculated for each of the geographic market segments easily accessible by existing and planned cable systems.

In contrast to trans-oceanic cables, satellite capacity usually can be shifted between geographic market segments within an ocean region. This makes allocation of available satellite capacity to specific geographic market segments within one ocean region arbitrary.<sup>87</sup> To avoid such

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<sup>85</sup> See Exhibits HSH-7 and HSH-10.

<sup>86</sup> This study takes into account that the capacity available for service to a certain geographic market may differ from the design capacity of individual cable sections. For example, the design capacity of the first segment of the Columbus-2 cable systems considerably exceeds the design capacity of the trans-Atlantic branch going to Europe.

<sup>87</sup> Note that this problem only exists for *available* capacity but did not emerge for *utilized* capacity. Once capacity becomes utilized, it will be utilized to serve a specific geographic region. Utilized capacity is thus clearly associated with the six geographic market segments.