

TELECOMMUNICATIONS FUTURE

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As emerging new technologies create excitement and anticipation in the communications sector, the continued economic downturn and uncertain regulatory climate have affected the pace of future industry growth and broadband deployment.

Indeed, by the end of 2003, the communications regulatory landscape was marked by uncertainty on many fronts, as the fate of the FCC's new broadcast ownership rules and its new rules governing unbundled network elements, line-sharing and broadband deregulation in the "Triennial Review" proceeding remained in jeopardy pending court review. Demand for new broadband services is expected to continue, however, as well as the development of important new wireless and voice-over-Internet protocol (VoIP) technologies.

The current focus of the FCC and Administration on improving spectrum management reflects the explosive growth in unlicensed and other wireless technologies, as well as anticipated future demand for spectrum-based services. Broadband over Power Line has emerged as a potential new platform for delivering communications services to the home. Moreover, several industries are engaged in a race to deliver a "triple play" of voice, video, and data services, which could spur greater broadband deployment. While the FCC continues down a deregulatory path in general, several emerging regulatory trends suggest a greater focus on consumer protection (as evidenced by the FCC's new telemarketing rules and consumer outreach programs), rural deployment, and homeland security.

By way of background, the past few years have marked the start of a broad economic downslide in the telecommunications market. The relatively new competitive side of the telecom industry, Internet service providers and related ventures, as well as telecommunications equipment manufacturers were particularly hard-hit. Although the future impact of the current market downturn is hard to predict, it could increase the role of the investment community and force regulators to give greater consideration to the financial implications of their decisions. Most analysts expect the telecommunications industry to rebound, although questions remain about the long-term viability of competitive local exchange carriers without greater regulatory intervention.

In the meantime, many predict further consolidation in the local telephone and long distance businesses, as well as among commercial mobile wireless providers now that the FCC has lifted its spectrum cap for these carriers. Further convergence among the information technology and services sectors and the telecommunications industry will be driven by cutting-edge technology developments and continued consumer demand for new products.

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This paper highlights several emerging and future technologies across the various sectors that will be critical to the telecommunications future, including unlicensed wireless, third-generation ("3G") wireless, VoIP, and new cable television and digital broadcast technologies. Many of these will enable greater head-to-head competition among wireline telephony, cable, and wireless companies. This paper also discusses the broader regulatory environment and trends, including the FCC's greater focus on consumer issues, rural deployment, and homeland security/public safety.

Unlicensed Wireless Technologies

As the FCC stated in a recent White Paper, "the market for wireless communications that operate on an unlicensed basis is experiencing unprecedented growth" which is "even more remarkable [considering] both the telecommunications and technology sectors are experiencing financial stress."^{2/} For example, in the five-year period 1998-2002, Part 15 equipment authorizations increased 60% over the previous five-year period.^{3/} In the past year, unlicensed device growth has been led by an explosive expansion in wireless local area networks ("W-LANs") – predominately based on Wi-Fi technology – which grew 73% in 2002, compared to 2001 shipments.^{4/} Ultra-wideband ("UWB"), the newest technology on the block, got off to an impressive start with nine equipment authorizations being granted in the first year after the adoption of the Commission's UWB rules. (By comparison, it took spread spectrum devices five years to reach the same number of authorizations after that technology was approved for unlicensed use.)^{5/} As described below, this strong consumer demand for unlicensed devices has not gone unnoticed by the Commission, which has moved to make more spectrum suitable for unlicensed use, and has reexamined spectrum management policies and techniques to seek other methods for increasing unlicensed access to spectrum.

5 GHz Wi-Fi Proceeding. Responding to a petition for rulemaking filed last year by the Wi-Fi Alliance, in June 2003 the Commission issued a Notice of Proposed Rulemaking that proposed to amend its Part 15 rules to make available an additional 255 MHz of spectrum (5.47 – 5.725 GHz) for use by National Information Infrastructure ("U-NII") devices and systems, which include wireless local area networks ("WLANs") operating pursuant to the IEEE's 802.11(a) ("Wi-Fi") standard.^{6/} The proposal increases by nearly 80% the amount of 5 GHz spectrum available for WLAN use, enabling future growth of unlicensed broadband networks.

^{2/} Kenneth Carter et al., "Unlicensed and Unshackled: A Joint OSP-OET White Paper on Unlicensed Devices and Their Regulatory Issues," OSP Working Paper 39 (May 2003) at 1 ("*White Paper*").

^{3/} *See id.* at 23.

^{4/} *See id.* at 33 (citing Gartner Dataquest). Wi-Fi device sales are expected to grow at a compounded 30% annual rate through 2006. *See, e.g.*, "What Do Budweiser and Wi-Fi Have in Common," available at www.silicon.com/news/500018/1/1036681.html (Dec. 5, 2002) (quoting Wi-Fi Alliance chairman Dennis Eaton).

^{5/} *See White Paper* at 25.

^{6/} *See* Revision of Parts 2 and 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure Devices in the 5 GHz Band, ET Docket No. 03-122, *Notice of Proposed Rulemaking*, FC 03-110 (rel. June 4, 2003) ("*NPRM*").

Under the proposal, devices would be required to use dynamic frequency selection (“DFS”), a “listen-before-talk” interference mitigation technique whereby the device checks a frequency for other users before transmitting. The Commission also proposed that devices employ a transmit power control (TPC) function, which adjusts the transmitter’s power output based on the signal strength at the receiver. Use of TPC ensures that the devices will transmit at the minimum power necessary to achieve the desired performance, thereby reducing interference potential to licensed (government) users and increasing overall network capacity.

Although comments in response to the *NPRM* were generally very positive, the License-Exempt Alliance (“LEA”) and some other commenters took exception to the FCC’s statement that the 100 MHz of spectrum available for unlicensed use in the 5.725-5.825 GHz band “will remain sufficient for higher-power operations.”^{7/} Other commenters focused on the need for a longer transition period to implement the TPC and DFS functions in existing Wi-Fi bands, and on a fine-tuning of those technical requirements. The IEEE asked the Commission to provide an actual allocation for WLANs and treat such devices as “licensed by rule,” in order to provide protection against secondary services such as amateur operations.

The *NPRM*’s proposal set the stage for international harmonization of Wi-Fi spectrum usage, creating the potential for economies of scale for device manufacturers. Delegates to the ITU’s World Radiocommunications Conference held in June-July 2003 (“WRC-03”) adopted a resolution that would make Wi-Fi use possible in the 5.150-5.350 GHz and 5.470-5.725 GHz bands. The FCC indicated that it could issue a Report and Order implementing the *NPRM*’s proposals by the end of 2003.

Ultra-Wideband. As expected, 2003 saw a continuation of the contentious debate over the Commission’s landmark April 2002 order ^{8/} permitting the operation of ultra-wideband (“UWB”) devices on an unlicensed basis. ^{9/} On March 12, 2003, the Commission released a Memorandum Opinion and Order (“*Reconsideration Order*”) and Further Notice of Proposed Rulemaking (“*Further Notice*”) ^{10/} addressing the fourteen petitions for reconsideration filed in reaction to the 2002 *UWB Order*. In doing so, the Commission also fulfilled its earlier

^{7/} *NPRM* at ¶ 18.

^{8/} See In the Matter of Revision of Part 15 of the Commission’s Rules Regarding Ultra-Wideband Transmission Systems, ET Docket No. 98-153, *First Report and Order*, 17 FCC Rcd 7435 (2002) (“*UWB Order*”). At the time of the *UWB Order*’s adoption, the docket had attracted over one thousand filings in the three-and-one half years since the release of the initial notice of inquiry in the proceeding.

^{9/} “UWB radio systems typically employ pulse modulation where extremely narrow (short) bursts of RF energy are modulated and emitted to convey information. Because of the very short duration of these pulses, the emission bandwidths from these systems are large and often exceed one gigahertz.” *UWB Order* at ¶ 5. UWB applications include short range, high data-rate communications, including peer-to-peer communications, imaging devices, ground penetrating radar and vehicle-based collision avoidance radar.

^{10/} See In the Matter of Revision of Part 15 of the Commission’s Rules Regarding Ultra-Wideband Transmission Systems, ET Docket No. 98-153, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, FCC 03-33 (rel. Mar. 12, 2002) (“*Reconsideration Order*” and “*Further Notice*”).

commitment to issue a further notice within six to twelve months of its original decision to explore whether more flexible regulations would be appropriate. [11/](#)

In the *Reconsideration Order*, the Commission made no significant changes to the existing UWB technical parameters, and denied all reconsideration petitions that had sought stricter operating limits on UWB devices. The Commission stated its expectation that testing using commercially-available UWB devices would take place over the next 12-18 months as UWB devices are introduced, and that it would continue to monitor developments to determine whether changes are warranted. [12/](#) The *Reconsideration Order* did, nevertheless, make some minor changes, primarily relaxing rules relating to ground penetrating radar (“GPR”) and wall imaging systems. [13/](#)

In response to a petition for reconsideration filed by Multispectral Solutions, Inc. (“MSSI”), the Commission proposed changes in the *Further Notice* to permit the operation of low pulse repetition frequency UWB systems in the 3.1-10.6 GHz band, pursuant to the rules for hand-held UWB devices. The Commission also proposed, in response to a petition from Siemens VDO Automotive, AG, to permit the operation, as UWB devices, of pulsed frequency hopping vehicular radars in the 22-29 GHz band.

Having failed in the *Reconsideration Order* to obtain tighter UWB operating limits, licensed service providers nevertheless continued to press their concerns that UWB devices would cause harmful interference to licensed operations. The Satellite Industry Association (“SIA”) petitioned for reconsideration of the *Reconsideration Order*, arguing that 4 GHz downlinks in the fixed satellite service (“FSS”) were at risk. [14/](#) Cingular Wireless also filed a new petition for reconsideration in which it broadly challenged the legal underpinnings of much of the Commission’s Part 15 regulatory scheme for unlicensed devices. Cingular argued that Section 301 of the Communications Act prohibits radio transmissions without a license, and that because only a few specific exceptions to this prohibition are enumerated in the statute, the Commission does not have authority to authorize other unlicensed uses. The *Reconsideration Order* was also challenged by Sprint, which filed a petition for review of the decision in the D.C. Circuit. The court stayed any judicial action on the petition pending the Commission’s resolution of Cingular’s petition for reconsideration.

[11/](#) *UWB Order* at ¶ 1.

[12/](#) *Reconsideration Order* at ¶ 1.

[13/](#) Specifically, the *Reconsideration Order*: amended the rules to facilitate the operation of wall imaging systems by law enforcement, emergency rescue and firefighter personnel in emergency situations; relaxed rules to permit greater use GPR and wall imaging systems between 960 MHz and 3.1 GHz; specified limitations on who may operate GPR and wall imaging systems, and for what purposes; clarified the coordination requirements for imaging devices; and eliminated the requirement for non-hand held GPRs to employ a “dead man switch.”

[14/](#) These C-band downlinks are used for program distribution to cable headends and broadcast stations, broadband communications to Navy vessels, weather data distribution to airlines, and position location for truck fleets.

Outside the regulatory arena, industry members struggled within the IEEE standards-setting body to settle on a single UWB standard for wireless personal area networks. Manufacturers were split between competing proposals – one based on a “traditional” UWB system that uses a broad swath of spectrum, and another that employs frequency-hopping over multiple bands. The FCC declined to enter the debate, despite a petition for declaratory ruling filed by Motorola and XtremeSpectrum [15/](#) that requested clarification of the Commission’s measurement rules as applied to frequency hopping systems. In responding to the petition, OET urged the IEEE to ensure that any standard developed will not cause levels of interference beyond that already anticipated by the rules.[16/](#) If the IEEE stalemate is not broken, it is expected that some companies may seek to agree on a standard in a different forum, raising the possibility that more than one standard is developed.

Broadband Over Power Lines. On April 28, 2003, the Commission issued a Notice of Inquiry to obtain information on various issues related to Broadband over Power Line (“BPL”) systems. [17/](#) An advanced form of carrier current systems (which are already permitted to operate as unlicensed, unintentional radiators under Part 15 of the Commission’s rules), BPL systems couple RF energy onto electrical power lines to provide high-speed communications. BPL systems can be used to provide room-to-room connectivity within a building (“In House BPL”) or over external medium voltage power lines (“Access BPL”) to provide Internet access. The Commission considers BPL to be a “last mile” delivery system that may provide consumers a competitive alternative to DSL and cable modem service, as well as facilitate the provision of broadband services to remote areas.

The NOI sought comment on the current state of BPL technology and on what changes to the Part 15 rules may be needed to facilitate the deployment of the technology. In response to the NOI, some spectrum licensees expressed concerns regarding possible harmful interference from BPL systems. National Public Radio (“NPR”), for example, stated that RF energy potentially could be carried through electrical wiring directly to electrically powered radios, causing impairment to the reception of FM radio services. The United Power Line Council (“UPLC”), however, argued that BPL systems have been tested extensively and do not cause harmful interference to other systems. The UPLC urged the Commission not to impose standards for BPL systems, which would act to discourage innovation at this early stage in the technology’s development.

[15/](#) Chip developer XtremeSpectrum announced plans to ship a production version of its Trinity chipset to device manufacturers by the 4th quarter 2003. See “XtremeSpectrum Delivers Ultra-Wideband Solution to Samsung,” *Press Release* (Sept. 9, 2003).

[16/](#) See Mary Greczyn, “IEEE Meeting Fails to Bring Closure to UWB Standards Debate,” *Communications Daily* (Sept. 22, 2003).

[17/](#) See Inquiry Regarding Carrier Current Systems, including Broadband Over Power Line Systems, ET Docket No. 03-104, *Notice of Inquiry*, FCC 03-100 (rel. Apr. 28, 2003).

Dozens of utilities have already conducted BPL technical and marketing trials. Although no utilities have initiated full-scale commercial service to date, a few have announced plans to do so by late 2003 or in 2004. [18/](#)

Spectrum Policy Task Force-Related Proceedings. In November 2002, the FCC's inter-bureau Spectrum Policy Task Force ("Task Force"), formed earlier in the year by Chairman Powell, issued its Report [19/](#) containing a number of recommendations for improving spectrum management, including the following technology-based solutions:

Cognitive Radios. In its Report, the Task Force recommended that the Commission consider various means to increase access to spectrum by unlicensed devices. One suggestion was to explore the future use of cognitive radios, an advanced subset of software-defined radios ("SDRs"). [20/](#) Cognitive radios are "smart" radios that can analyze and adapt to their immediate environment. They locate unused spectrum or "white space" in existing bands in order to reuse spectrum efficiently without interfering with existing users. In doing so, cognitive radios consider the dimensions of frequency, time and space. For example, a cognitive radio could find "open" frequencies, take advantage of unused time slots between another user's transmissions, or use beam steering or null steering to minimize the reception of its signal by another user.

In conjunction with a cognitive radio workshop held in May 2003, the Commission opened a new docket, ET Docket No. 03-108, and indicated that it planned to issue a Notice of Inquiry to identify potential changes to the Commission's technical rules or other procedures that could be helpful in facilitating the development of cognitive radios.

Interference Temperature. To address concerns regarding the subjective nature of the current definition of harmful interference, [21/](#) the Task Force recommended that the Commission adopt a more quantitative approach to interference management. Rather than focusing on *transmitter* operations for assessing potential interference, under Task Force's proposal, the key factor would become the environment in which the *receiver* operates. To enable this paradigm shift, the Task Force recommended the development of a new metric, the "interference temperature," which would be a measurement of the RF power present at the receiving antenna, per unit of bandwidth.

[18/](#) See Dinesh Kumar, "Manassas Va. Set to Roll Out Broadband Over Power Line," *Communications Daily* (Aug. 27, 2003) at 6.

[19/](#) See Spectrum Policy Task Force Report, ET Docket No. 02-135 (rel. Nov. 15, 2002) ("*Report*").

[20/](#) See *Report* at 63. The Commission has defined SDRs as "a radio that includes a transmitter in which the operating parameters of frequency range, modulation type or maximum output power (either radiated or conducted) can be altered by making a change in software without making any changes to hardware components that affect radio frequency emissions." See Authorization and Use of Software Defined Radios, ET Docket No. 00-47, *First Report and Order*, FCC 01-264 (Sept. 14, 2001).

[21/](#) "Harmful interference" is defined as: "Interference which endangers the functioning of a radionavigation service or other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with these [international] Radio Regulations." 47 C.F.R. § 2.1.

Interference temperature limits would be set for the total amount of undesired power – generated by other emitters and noise sources – present at the location of the receiver being protected. Below this limit, unlicensed devices (incorporating cognitive radio technology to “take the temperature” of the RF environment) [22/](#) could operate; above this limit they could not, as it would be considered “harmful interference.” Different threshold levels could be set for each band, geographic region or service. Establishing such a system would be a substantial undertaking, requiring actual measurements of the noise floor in a wide variety of contexts and locations. The Task Force recommended that the Commission create a public/private partnership for a long-term noise (interference temperature) monitoring network.

OET Bureau Chief Ed Thomas has indicated that the FCC could issue an NOI on the topic as early as the end of 2003. [23/](#)

Receiver Standards. Currently, nothing in the Commission’s rules requires that receivers be designed in such a way to resist interference. The *Report* recommended that the Commission explore means of encouraging or requiring minimum receiver interference immunity performance standards. Making receivers that are less susceptible to interference would facilitate spectrum sharing, including spectrum access by unlicensed devices. Generally, the Task Force prefers an incentive approach. Under its proposal, the Commission would establish voluntary standards, but would not protect users of receivers not meeting the standard from harmful interference. [24/](#)

Following up on the *Report*’s recommendations, the Commission in March 2003 issued a Notice of Inquiry seeking broad comment on the issues raised in the *Report*, while noting that it preferred to rely primarily on market incentives and voluntary industry programs. [25/](#) The NOI attracted over 50 filings, with most licensed service providers recommending that the Commission continue to permit the market to dictate receiver design, cautioning that mandated standards could increase costs to consumers and stifle innovation.

Administration Spectrum Policy Initiative. In June 2003 President Bush issued a Presidential Memorandum establishing a Spectrum Policy Initiative to develop recommendations

[22/](#) As the Report described it, an unlicensed device’s “built-in ‘thermometer’ would record interference temperature data and compute the appropriate statistical aggregate value. The device would then project the increase in interference temperature due to its operation over its nominal range. This value would be compared with the permissible limit. If its operation would exceed the limit, the device’s controller could execute an appropriate response such as reducing power, switching to a different transmit frequency (if available) or, perhaps, continuing the scanning/sensing process to locate an opportune time to transmit.” *Report* at 34.

[23/](#) “FCC to Allocate More Spectrum for 5 GHz Unlicensed Devices,” Telecommunications Reports (Feb. 15, 2003).

[24/](#) See *Report* at 31.

[25/](#) See Interference Immunity Performance Specifications for Radio Receivers, ET Docket No. 03-65, *Notice of Inquiry*, FCC 03-54 (rel. Mar. 24, 2003) at ¶ 2.

for improving federal government spectrum management policies and procedures. The Memorandum recognized that the existing legal and policy framework has not kept pace with changes in technology and spectrum use. As part of the initiative, a Federal Spectrum Task Force, consisting of a dozen Federal agencies and Departments and chaired by the Commerce Department, was formed to develop specific recommendations for creating incentives to increase the efficient use of spectrum, streamlining the deployment of new technologies and services, and addressing the critical needs of national and homeland security and public safety. The recommendations are due to the President by June 2004.

Third-Generation Wireless Services

The explosion of wireless technology and the increasing popularity of wireless services (as evidenced by continued growth in subscribership) have created a desperate need for additional spectrum to support the continued growth and evolution of these services. In response to industry needs, the FCC and NTIA have worked diligently to identify new spectrum allocations and to synchronize the Multipoint Distribution Service spectrum bands, as discussed below. The FCC has also adopted new, liberalized spectrum leasing rules in order to facilitate distribution of spectrum to entities that seek to develop and deploy new wireless services.

Specifically, the FCC has, in coordination with the National Telecommunications and Information Administration (“NTIA”), taken a number of steps to identify and reallocate spectrum that could be used to provide advanced wireless services (“AWS”), including 3G services. In November 2002, the FCC issued an order allocating 90 megahertz of spectrum for AWS in two contiguous blocks (1710-1755 and 2110-2155 MHz). ^{26/} This spectrum has been designated for fixed and mobile services and can be paired to provide AWS services. In addition, the FCC is considering making additional spectrum available for AWS in the 1910-1920 MHz, 1990-2000 MHz and 2020-2025 MHz bands. As set forth in the FCC’s June 19, 2003 Report to Congress, however, it is unclear at this time when this additional spectrum, if allocated to AWS, would be made available to the public. ^{27/} Finally, the FCC is seeking ways to make the Multipoint Distribution Service (“MDS”) and Instructional Television Fixed Service (“ITFS”) bands at 2500-2690 MHz more useful for AWS.

The 1.7 GHz band (1710-1755 MHz) becomes available for non-Federal Government use as of January 2004. However, service rules for this band have not been adopted and no date has been established for an auction of the band. The band is currently used by government fixed microwave links and defense systems. Government users may remain primary in the band until their relocation costs are paid by the new licensees. The expected cost of relocation will be made public prior to the auction. Some government users are statutorily exempted from mandatory relocation and will have to be protected from interference, although they may voluntarily choose to relocate. In its *2002 Viability Assessment*, NTIA proposed that:

^{26/} Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, *Second Report & Order*, 17 FCC Rcd 23193 (2002).

^{27/} Auction Reform Act of 2002, *Report to Congress*, 18 FCC Rcd 12556 (2003).

(1) Federal Government non-military systems and Department of Defense (“DOD”) fixed microwave systems be relocated; (2) existing facilities at 16 sites where DOD has the right to continued primary use also be relocated; (3) DOD ground systems remain on a primary basis at two of these 16 sites (Cherry Point, N.C. and Yuma, Ariz.), but operate on a secondary, coordinated basis at all other sites; and (4) precision guided munitions systems continue to operate on a primary basis in the 1710-1720 band segment until the current inventory is exhausted or until the end of 2008, whichever occurs first.

The 2.1 GHz band (2110-2155 MHz) becomes available for non-Federal Government use as of January 2004. However, service rules for this band have not been adopted and no date has been established for an auction of the band. The 2110-2150 MHz portion of the band is currently allocated for non-Government fixed and mobile services. It is used by common carrier microwave links at 2110-2130 MHz, and by private, fixed-service licensees at 2130-2150 MHz. These incumbent licensees are entitled to compensation from the new licensees for any relocation expenses. The 2150-2155 MHz portion of the band is currently used by MDS operators. Although the FCC has stated that relocated MDS licensees are entitled to comparable facilities and spectrum, it has not yet made a determination with regard either to replacement spectrum or a relocation reimbursement policy.

The 1.9/2.1 GHz band. On February 10, 2003, the FCC released an *NPRM* seeking comment on a proposal to reallocate all or a portion of the 1.9, 2, and certain additional 2.1 GHz bands to AWS or 3G. [28/](#) Any final decision on this band is likely many months away, and it appears that the earliest date for actual service deployment using these bands could be three or more years into the future. Moreover, the FCC could determine that some of this spectrum is better used as replacement spectrum for Nextel as part of a broader proposal to mitigate interference to public safety licensees currently operating at 800 MHz, or for MDS operators currently operating at 2150-2160 MHz as a relocation band.

The 1910-1920 MHz band is currently allocated to asynchronous unlicensed PCS (“UPCS”). Although there is virtually no asynchronous UPCS activity in this band, the UPCS industry association (known as UTAM) has largely cleared the band of incumbent microwave users. The FCC proposes that new licensees reimburse UTAM for its band clearing costs. The 1990-2000 MHz band and the 2000-2025 MHz band were formerly allocated to the Mobile Satellite Service (MSS), and the only incumbents are Broadcast Auxiliary Service licensees. The 2155-2160/62 MHz band is currently used for MDS (licenses granted after 1992 in the 2160-62 MHz band operate on a secondary basis). The 2160-2165 MHz band is currently used by non-Government fixed and mobile services. In 1992, the FCC identified this band for new advanced fixed and mobile services and adopted rules and procedures to permit new licensees to relocate existing fixed service microwave licensees from this spectrum band. Finally, the 2165-2180 MHz band, formerly assigned to MSS, has been reallocated for fixed and mobile services.

[28/](#) Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, *Third Notice of Proposed Rulemaking*, 18 FCC Rcd 2223 (2003).

The MDS bands (2500-2690 MHz). The FCC released an *NPRM* on April 2, 2003 that proposes major changes to the services rules in an attempt to reduce interference in the band and promote more flexible usage. Although a few comments have been filed in response to the *NPRM*, it is unclear when the Commission will act on this matter. This band is currently licensed to MDS and ITFS operators. Up to 90% of all MDS licenses are currently held by four entities: WorldCom, Sprint, NuCentrix and BellSouth. WorldCom's licenses cover some 31 million households and more than half the total licenses, but WorldCom is seeking to transfer these licenses to Nextel following a successful bankruptcy auction of the WorldCom licenses.

Broadband Regulation and the FCC's Triennial Order

In August of this year, the FCC released its long-awaited *Triennial Order*, ^{29/} in which it substantially revised the rules that govern the unbundling of ILEC network elements pursuant to Section 251 of the Telecommunications Act. The order reflects a general trend in favor of deregulating wireline broadband services, on the theory that ILECs will be more likely to invest in broadband deployment if they are not required to make newly constructed facilities available to competitors upon request. At the same time, the order recognizes that regulation remains an important component of local telephone service, where consumer demand is stagnating as a result of competition from wireless service, as well as newer technologies such as VoIP, which is discussed below.

In the most hotly contested issue in the proceeding, the *Triennial Order* declined to eliminate unbundled switching as a network element. Instead, the FCC delegated to the states primary authority for determining whether to keep unbundled switching in place, depending on whether sufficient competition exists in a given market. The primary effect of that decision is that competitive carriers will largely continue to have access to the UNE-platform, or UNE-P, which is a combination of network elements (including switching) that is widely used by CLECs to provide local telephone service. On a related note, in September the FCC launched a proceeding to revisit the total element long-run incremental cost ("TELRIC") pricing standard for unbundled network elements. The TELRIC proceeding promises to have a significant impact on the prices ILECs charge for access to UNEs and UNE combinations such as UNE-P.

The Triennial Order also gave substantial relief to ILECs with respect to the unbundling of network elements used to provide broadband Internet access services. Most notably, the FCC ended the requirement that ILECs provide unbundled access to the high-frequency portion of the loop (known as line sharing). The FCC also declined to require unbundled access to fiber-to-the-home loops and "hybrid" loops (loops that are part fiber and part copper).

The FCC's broadband regulation framework is still very much a work in progress. For one thing, the *Triennial Order* faces numerous legal challenges, by ILECs and by competitors. In addition, the Triennial Review proceeding is only one of four FCC proceedings

^{29/} *Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, CC Docket Nos. 01-338, 96-98, 98-147, FCC 03-36 (Aug. 21, 2003).

designed to develop a comprehensive national broadband policy. Three other proceedings – one addressing cable modem service, one addressing general wireline broadband services, and one addressing the regulatory treatment of broadband services provided by ILECs – are still underway. The FCC has identified several goals in the wireline broadband proceeding, including the development of an analytical framework for broadband that is consistent across different platforms, the encouragement of intermodal competition, and the promotion of a “minimal” regulatory environment for broadband services in order to promote investment and innovation. The FCC has already classified cable modem service as an interstate information service, and has tentatively concluded that wireline broadband Internet access services are also information services. The upcoming orders will determine the extent to which these services should be regulated, if at all.

Voice-over-Internet Protocol

One emerging technology -- VoIP -- has spurred new debate at the FCC and at state regulatory commissions concerning the appropriate regulatory distinction between telecommunications and information services.

The Communications Act has long distinguished between the provision of a “telecommunications service” ^{30/} and an “information service.” ^{31/} In simplified terms, basic voice service – which involves the transmission of information between points without a change in format or content – is a “telecommunications service,” whereas an Internet Service Provider (“ISP”) offering – which can involve, among other things, the storage and retrieval of information via telecommunications – is an “information service.” While providers of telecommunications service typically are subject to Federal and state regulations such as tariff requirements, access payment obligations, and universal service contributions, providers of information services generally have been protected from regulation because of policy efforts intended to promote their growth and availability.

The emergence of VoIP service has presented a challenge to these traditional methods of categorization. Providers of VoIP service typically employ the same technologies and transmission methods as ISPs. This suggests that they should be afforded the same regulatory protections as providers of information service. However, because VoIP service often is indistinguishable (from an end user perspective) from basic voice service, some have argued that VoIP service is a telecommunications service and thus should be subject to the same regulation as voice service provided by traditional carriers.

^{30/} “Telecommunications service” is defined as “the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used.” 47 U.S.C. § 153(46). “Telecommunications” is defined as “the transmission, between or among points specified by the user, of information of the user’s choosing, without change in the form or content of the information as sent and received.” *Id.* at § 153(43).

^{31/} “Information service” is defined as “the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service.” *Id.* at § 153(20).

Three petitions addressing the regulatory treatment of VoIP service are pending before the FCC. The first, filed by AT&T, seeks a declaratory ruling that AT&T's phone-to-phone IP telephony services are exempt from access charges. [32/](#) The second, filed by Pulver.com, seeks a declaratory ruling that the company's point-to-point broadband Internet protocol voice communications service is neither "telecommunications" nor a "telecommunications service" as those terms are defined under the Communications Act. [33/](#) The third, filed by Vonage Holdings Corporation, seeks a declaratory ruling that the FCC preempt an order by the Minnesota Public Utilities Commission requiring Vonage to comply with state laws governing providers of "telephone service," as Vonage claims its VoIP service is an information service. [34/](#) It is possible that the issues raised in these petitions will be subsumed by a regulatory proceeding later this year that will address more broadly the issues implicated by VoIP service.

In the meantime, state regulatory commissions have been confronting the VoIP issue on an individual basis with mixed results. For instance, as noted above, the Minnesota Public Utilities Commission held earlier this year that Vonage Holdings Corporation, a provider of VoIP service, is a provider of "telephone service," as that term is defined by state statute, and thus must comply with all state certification and provisioning requirements relating to 911 service. [35/](#) Other state commissions are in the process of investigating this issue – or are considering initiating investigations – but have not yet issued such definitive rulings. [36/](#)

[32/](#) See Petition for Declaratory Ruling that AT&T's Phone-to-Phone IP Telephony Services are Exempt from Access Charges, WC Docket No. 02-361, October 18, 2002; see also "Wireline Competition Bureau Seeks Comment on AT&T's Petition for Declaratory Ruling that AT&T's Phone-to-Phone IP Telephony Services are Exempt from Access Charges," FCC Public Notice, WC Docket No. 02-361, November 18, 2002.

[33/](#) See Petition for Declaratory Ruling that Pulver.com's Free World Dialup is Neither Telecommunications Nor a Telecommunications Service, WC Docket No. 03-45, February 5, 2003; see also "Pleading Cycle Established for Comments on Pulver.com Petition for Declaratory Ruling," WC Docket No. 03-45, February 14, 2003.

[34/](#) See Vonage Holdings Corp. Petition for Declaratory Ruling Concerning an Order of the Minnesota Public Utilities Commission, WC Docket No. 03-211, September 22, 2003; see also "Pleading Cycle Established for Comments on Vonage Petition for Declaratory Ruling," WC Docket No. 03-211, September 26, 2003.

[35/](#) See *In the Matter of the Complaint of the Minnesota Department of Commerce Against Vonage Holding Corp. Regarding Lack of Authority to Operate in Minnesota*, Docket No. P-6214/C-03-108, Order Finding Jurisdiction and Requiring Compliance, September 11, 2003.

[36/](#) See, e.g., Letter from Gary A. Evenson, Acting Administrator, Telecommunications Division, Public Service Commission of Wisconsin, to 8x8, Inc., August 13, 2003 (stating that "without certification in Wisconsin, 8x8 [a provider of voice-over-IP local phone service] *legally cannot* provide resold intrastate service in Wisconsin") (emphasis in original); *In re Petition for a Declaratory Order Regarding Classification of IP Telephony Service*, Docket No. 29016, Alabama Public Service Commission Order Establishing Declaratory Proceeding, August 12, 2003.

Digital “Plug and Play” Cable Compatibility

In September 2003, the FCC adopted rules for digital “plug and play” cable compatibility, taking an important step in the digital television transition. ^{37/} The rules were adopted, with some alteration, from the December 2002 Memorandum of Understanding between the cable and consumer electronics industries, which contained a combination of voluntary and inter-industry agreements, technical and labeling standards, and proposed encoding rules. The FCC’s rules will allow television sets to be constructed with plug and play functionality for unidirectional digital cable services (i.e., non-interactive cable services). Consumers will need to obtain a CableCARD™ (security card) from their local cable operator. The CableCARD™ is inserted into the back of a television set and allows consumers to view the scrambled programming provided by the cable operator.

Much of the FCC’s unidirectional encoding rules address copy protection standards and methods, a particularly controversial issue between the cable industry, consumer electronics industry, content owners such as the film and music industries, and consumer rights groups. The FCC’s rules prohibit the use of selectable output controls by all multichannel video programming distributors (cable, satellite, etc.), prohibits down-resolution of broadcast programming, and requires 30-day notice to the FCC for any down-resolution of non-broadcast programming. The FCC’s encoding rules, modeled on the Digital Millennium Copyright Act, prohibit copying of pay-per-view and video-on-demand services; allow for one-time consumer copying of basic and extended basic cable service; and place no restriction on the copying of broadcast content. The FCC’s rules do not apply to content distributed over the Internet or for services offered via broadband technologies such as cable modem or digital subscriber lines.

The FCC’s rules do not apply to bi-directional digital cable services (e.g., interactive services such as video-on-demand, impulse pay-per-view and cable operator-enhanced electronic programming guides). The cable and consumer electronics industries continue to negotiate agreements which will address plug and play functionality for bi-directional services. The FCC’s adoption of rules covering unidirectional services is widely viewed as an important foundation for the resolution of issues confronting bi-directional services. While the ultimate goal is to have a single digital television set with both unidirectional and bi-directional plug and play functionality, at the present time, however, consumers will continue to need set-top boxes to receive, view and utilize bi-directional services. Once the cable and consumer electronics industries complete negotiations on bi-directional functionality (and obtain FCC approval), the legal and technical foundation for the production of integrated digital televisions will be complete. Thereafter, consumers should be able to purchase digital television sets that provide full unidirectional and bi-directional plug and play functionality and bid farewell to set-top boxes and at least one extra remote control.

^{37/} Plug and play functionality refers to the ability of consumers to plug their cable directly into a digital television set without the need for a set-top box.

Digital Broadcasting

In the broadcast area, the significant technological advance that continues to grab the headlines is the looming conversion from analog to digital for both radio (Digital Audio Radio or DAR) and television (DTV).

The FCC has adopted rules that permit AM and FM radio stations to begin operating digitally using an in-band on-channel (IBOC) transmission system developed by iBiquity (the IBOC system allows a station to transmit both its digital and analog signals simultaneously within the station's already licensed channel). However, only a few dozen stations across the country are broadcasting digital signals and digital radio receivers have yet to hit the consumer marketplace.

Although digital radio is still in its infancy, the transition to digital television appears to be on the verge of a watershed. Once fully realized, the conversion to DTV will transform television as we now know it. DTV technology already allows broadcasters to offer television with movie-quality picture and CD-quality sound, along with a variety of other enhancements. DTV technology can also be used to transmit large amounts of other data into the home, which may be accessible by using your computer or television set.

Digital television broadcasts are already available throughout the United States. In fact, as of September of this year, over 1000 television stations, located in over 200 different markets and covering more than 99 percent of U.S. TV households, were broadcasting digital signals. Additionally, the major broadcast networks are now delivering a significant portion, if not all, of their prime-time programming in high-definition digital (HDTV). Driven by the availability of digital programming and the continued drops in the price tag of what were once prohibitively costly DTV monitors, it appears that the sale of DTV sets is no longer limited to early adopters.

Most television broadcasters have been provided with sufficient spectrum to transmit both analog and digital programming simultaneously during the DTV transition. However, at the end of the DTV transition, broadcasters will have to give back the spectrum currently being used for analog transmissions. Although the DTV transition is currently scheduled for completion by the end of 2006, the pace at which the general public invests in new DTV monitors is significant because the deadline for the end of the transition will extend beyond 2006 absent widespread consumer adoption of DTV technology. The analog spectrum that is recaptured at the completion of the DTV transition will be auctioned off to wireless carriers. In fact, some spectrum has already been auctioned in anticipation of the recapture.

On the regulatory front, the Commission has been systematically tackling the outstanding issues that face the DTV transition, and most recently adopted rules (described above) for digital "plug and play" cable compatibility, which will allow consumers to connect cable service directly to their DTV sets without the need for a set-top box. Key among the still unresolved issues, however, remains the question of what level of copy protection technology may be used by digital programmers to prevent unauthorized redistribution of their digital content. Until this and other thorny issues are resolved it is likely unlikely that DTV will achieve widespread consumer adoption.

New Regulatory Trends

As noted above, the FCC's general deregulatory trend has been balanced by a greater focus on consumer protection, rural deployment, and homeland security-public safety issues, which has led to increased regulation and enforcement in areas such as enhanced 911.

Consumer Protection. In recent years, the FCC has significantly expanded its role in the consumer protection area, creating the Consumer and Governmental Affairs Bureau and increasing its consumer outreach efforts. The Commission has also established a "Consumer Center" on the main page of its website, which includes links to information on the Do-Not-Call registry and disability issues, among others.

More recently, in July the Commission released a Report and Order revising its telemarketing rules and adopting new rules to provide consumers with options for avoiding unwanted telephone solicitations. ^{38/} Specifically, the Commission established with the Federal Trade Commission (FTC) a national do-not-call registry for consumers who wish to avoid unwanted telemarketing calls. Despite the efforts of the FCC and the FTC, various federal courts have issued recent rulings striking portions of the FTC's telemarketing rules that established the national database. The registry was expected to become effective on October 1. Although the ultimate implications of the court actions are uncertain, it is clear that the FCC will be engaged on this issue for the long term, and Chairman Powell has vowed to uphold the FCC's enforcement of these rules.

In the wireless context, the FCC has been actively engaged in matters related to Enhanced 911 ("E911") and local number portability, and carriers have adopted voluntary measures to address growing consumer and regulatory concerns regarding wireless service quality. In addition to levying hefty fines against several of the nationwide wireless carriers as punishment for delays associated with implementation of E911, the Commission issued a "Consumer Advisory" discussing matters related to provision of E911 service and suggesting that consumers find out whether E911 has been deployed in their area and, if not, counseling consumers to "make sure to tell the emergency dispatchers your phone number and where you are."

With respect to local number portability, the Wireless Telecommunications Bureau has consistently stated that wireless carriers are expected to meet the November 24 implementation deadline established by the Commission in July 2002, even though CTIA and certain nationwide wireless carriers' requests for clarification on related technical matters remain outstanding. ^{39/} Moreover, CTIA continues to press the Commission to mandate wireless-wireline number portability, arguing that wireless-wireless portability, on its own, hinders competition.

^{38/} Rules and Regulations Implementing the Telephone Consumer Protection Act of 1991, *Report & Order*, 18 FCC Rcd 14014 (2003).

^{39/} *See, e.g.*, Letter from John Muleta, Chief, Wireless Telecommunications Bureau, to John T. Scott, Verizon Wireless, & Michael F. Altschul, CTIA, DA 03-2190 (rel. July 3, 2003).

In an effort to counteract potential state regulatory action on wireless service quality, on September 9, CTIA, in partnership with its wireless carrier members, launched a 10-part Consumer Code that enumerates voluntary industry principles, disclosures and practices. The voluntary Consumer Code is designed to help consumers make informed choices when purchasing wireless services, better understand their wireless services and rate plans, and ensure that wireless carriers continue to meet their needs. Carriers complying with the 10-points associated with the code will receive authorization to display a "Seal of Wireless Quality/Consumer Information" on packaging.

The FCC has also made provision of telecommunications services to persons with disabilities a very high priority. In this regard, the Commission has been actively engaged in matters related to telecommunications relay services (TRS) [40/](#) and Section 255 implementation. [41/](#) Likewise, on the media side the FCC has undertaken significant efforts on video description (to enhance television viewing by blind or visually impaired persons) and closed captioning (providing visual text to describe dialogue, background noise, and sound effects on television programming, pursuant to Section 713 of the Communications Act, to assist the deaf and hard of hearing).

Rural Deployment. The FCC has taken numerous actions this year to ensure that consumers in rural areas have access to basic telecommunication services and to encourage the deployment of advanced telecommunication services to rural communities. For example, in September, the Commission adopted an NPRM proposing ways to amend its spectrum regulations and policies in order to promote the continued rapid and efficient deployment of quality spectrum-based services in rural America and to help improve wireless services in these areas. [42/](#)

In August, the Commission initiated the "Lands of Opportunity" initiative for rural America and identified three regions - tribal lands, Appalachia and the Mississippi Delta - for a comprehensive, sixteen-month effort to inform consumers about the policies, rules and federal programs available to improve access to telecommunications services. The Commission explained that the first step in this new outreach effort would be to increase the awareness of the federal Universal Service Lifeline program, which provides discounts for local phone service to eligible low-income consumers, and Link-Up, which provides discounts for low-income consumers for phone line installation. Likewise, the Commission plans to deliver educational materials about these programs to community centers, community health care providers, state and local public welfare offices, and other outlets to ensure that eligible consumers are aware of these programs and have the opportunity to subscribe to them. Thereafter, the Commission intends to expand the scope of the outreach to include other universal service programs,

[40/](#) TRS permits people who are not hearing impaired to talk to those with hearing disabilities, and vice versa.

[41/](#) Section 255 of the Communications Act requires that telecommunications manufacturers and service providers make their products and services accessible to people with disabilities, if readily achievable.

[42/](#) See FCC Proposes Amending Current Spectrum Regulations In Order to Promote Wireless Services in Rural America, *FCC News Release* (Sept. 10, 2003).

participation in regional workshops, conferences and events focusing on telecommunications issues in these regions of rural America.

In July, the FCC's Wireless Telecommunications Bureau and the U.S. Department of Agriculture Rural Utilities Service held a kick-off meeting of the "Federal Rural Wireless Outreach Initiative." ^{43/} The event brought together representatives from the federal government, the wireless industry, and the rural community as well as other interested stakeholders. The initiative is designed to exchange program and regulatory information about rural development and wireless telecommunications access in rural areas between the Commission and the USDA, and to enhance greater service deployment in rural America.

Homeland Security and Public Safety. In the aftermath of the September 11, 2001 terrorist attacks, the FCC has established itself as a key player in homeland security efforts, particularly those related to protecting the nation's critical communications infrastructure. The FCC has defined its role to "provide leadership in evaluating and strengthening the Nation's communications infrastructure, in ensuring rapid restoration of that infrastructure in the event of disruption, and in ensuring that essential public health and safety personnel have effective communications services available to them in emergency situations."

The Commission formalized its homeland security efforts in 2003, when it announced its Homeland Security Action Plan and the establishment of an Office of Homeland Security within the agency. Relying heavily on partnerships with other government entities, industry, and citizen groups, the action plan discusses further efforts to: (1) evaluate and strengthen measures for protecting the Nation's communications infrastructure; (2) facilitate rapid restoration of the U.S. communications infrastructure and facilities after disruption by a threat or attack; and (3) develop policies that promote access to effective communications services by public safety, public health, and other emergency and defense personnel in emergency situations.

Furthermore, the terrorist attacks have pushed public safety issues to the forefront of the FCC and Capitol Hill agenda, and public safety groups have asked Congress to provide assistance in securing spectrum reallocated to public safety at 700 MHz but still being used by certain analog broadcasters. Although the FCC established rules for public safety use in the 700 MHz band (764-776 and 794-806 MHz) in 1998, the broadcasters currently occupying this spectrum are not required to move from the spectrum until 2006 at the earliest. As a result, much of this public safety spectrum is unusable in the most populous areas of the country, pending completion of the transition.

Likewise, public safety groups have sought the FCC's assistance with interference concerns, and in March 2002, the FCC released an *NPRM* seeking to improve public safety communications in the 800 MHz band. In light of the universal recognition of the magnitude of the problem, parties to the proceeding have been actively engaged in forging a solution, either

^{43/} See FCC and USDA Hold Kick-Off Meeting of the "Federal Rural Wireless Outreach Initiative," *FCC News Release* (July 2, 2003).

through rebanding the frequencies or relying on the use of “best practices” and technical rule changes.

In light of the need to foster interoperability and accommodate a variety of new public safety broadband applications, the FCC recently established licensing and service rules for the 4.9 GHz band (4940-4990 MHz). In 2002, the Commission allocated this 50 megahertz of spectrum for fixed and mobile services (except aeronautical mobile service) and designated the band for use in support of public safety. The FCC's May 2003 order limits eligibility for licensing in the 4.9 GHz band to those entities providing "public safety services"; permits broadband mobile operations, fixed hotspot use, and temporary fixed links on a primary basis in the band; and establishes a "jurisdictional" geographical licensing approach for operations in the band, whereby licensees will be authorized to operate in those geographic areas over which they have jurisdiction and will be required to cooperate in the use of spectrum.

As noted previously, the FCC and Congress have increased their vigilance over matters related to provision of Enhanced 911 (“E911”). For example, the FCC has separately levied significant fines on wireless carriers AT&T Wireless, Cingular and T-Mobile due to delays in rolling out their respective E911 services. On Capitol Hill, H.R. 2898, legislation that seeks to speed deployment of E911 service and provides significant funding for a new E911 grant program, has received broad support among Members.