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Building The
Wireless Future™

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October 27, 1994

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W. - Room 222
Washington, D.C. 20554

RE: Ex Parte Letter - GEN Docket No. 90-314
Personal Communications Services

Dear Mr. Caton:

On Thursday, October 27, 1994, the undersigned, Robert F. Roche, Director For Research, Cellular Telecommunications Industry Association (CTIA), sent the attached letter to Dr. Robert Pepper, Chief, Office of Plans & Policy, FCC, and to Mr. John Williams, Office of Plans & Policy.

Pursuant to Section 1.1206 of the Commission's Rules, an original and one copy of this letter and the attachment are being filed with your office.

If there are any questions in this regard, please contact the undersigned.

Sincerely,


Robert F. Roche

Attachment

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**Building The
Wireless Future™**

October 27, 1994

Dr. Robert Pepper
Office of Plans & Policy
Federal Communications Commission
1919 M Street, N.W. - Room 822
Washington, D.C. 20554

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RE: Ex Parte Letter - GEN Docket No. 90-314
Personal Communications Services

Dear Dr. Pepper:

Per your request, I attach a brief background piece on PCS standards issues, including a status update on the private industry standards setting process. As both the background piece, and attached article note, the Joint Technical Committee is currently reviewing the proposed Common Air-Interfaces for PCS.

If there are any questions in this regard, please contact the undersigned.

Sincerely,


Robert F. Roche

Attachment

cc: John Williams, OPP

PCS Standards Issues

The wireless industry standards-setting bodies have been diligently working on standards issues over the past two years. Simultaneously, companies have been testing technologies and services, and working with manufacturers to clarify their requirements.

These efforts have focused on:

- Common Air-Interface
- Service Descriptions
- System Requirements
- Network Reference Models
- Radio to Switch Interface
- Intersystem Operations
- Mobility Management via a Mobile Application Platform
- Privacy and Authentication

The issue which has attracted the most attention has been that of a Common Air-Interface. The Joint Technical Committee (JTC), consisting of representatives from the Telecommunications Industry Association (TIA) TR46.3.3 committee and T1P1.4 committee, has been working on a Common Air-Interface standard. It has winnowed down the number of proposed interfaces from 17 to seven over a period of several months.¹ These seven remaining include:

PCS-2000 (Composite CDMA/TDMA/FDMA)	Omnipoint
Upbanded IS-94 (Large Cell CDMA)	Qualcomm
PACS (Small Cell TDMA)	Bellcore
Upbanded IS-54 (Large Cell TDMA)	Ericsson
PCS-1900 (GSM DCS-1900)	MCI
DCTU (U.S. version of DCT)	Ericsson
Wideband CDMA	OKI

As the above indicates, most of the proposed interface standards are variants of three standards: (1) Code-Division Multiple Access (CDMA), (2) Time-Division Multiple Access (TDMA), and (3) a TDMA-related European standard called Global System for Mobile Communications (GSM). Each of these standards has been in development for some time, and two -- TDMA and GSM -- are currently being deployed in the U.S. and Europe, respectively. CDMA has not yet been deployed, but is being

¹ See Paula Bernier, "Mapping Out A General Direction: PCS Standards Give Bidders A Good Starting Point," *Telephony*, September 26, 1994 (reporting on the progress of the interface standard review).

tried both domestically, and abroad in Australia, Korea and elsewhere.² Most of the seven interfaces noted above are now or will be available within the next year.

The existence of these differing standards has fostered a competitive race which has benefited all service providers. The existence of CDMA as a prospective standard has driven the fine-tuning of TDMA-based systems, even as the existence of TDMA-based systems has driven the development of CDMA, and accelerated its availability.

Worldwide, GSM systems are licensed in 63 countries. Non-European TDMA systems are licensed in 13 countries. While CDMA is not currently commercially available, it is being tested by a number of would-be-PCS and cellular licensees, and has been licensed in Korea.³

Manufacturers can and are willing to develop systems supporting any of these standards. Currently, the companies offering systems built to the European GSM standard include: the manufacturers Alcatel, AT&T, Ericsson, Motorola, Nokia, Northern Telecom, Philips, and Siemens. U.S. companies which have tested GSM include American Personal Communications and MCI. The companies offering systems built to the non-European TDMA standard include: AT&T, Ericsson, Hughes Network Systems, Motorola, and Northern Telecom. U.S. companies which have tested and purchased systems using the TDMA standard include such service providers as McCaw Cellular, BellSouth Cellular and Southwestern Bell Mobile. The companies offering systems built to the CDMA standard include: AT&T, Northern Telecom, InterDigital, and Qualcomm (which last is the original developer of CDMA). Companies which have tested and indicated a commitment to CDMA include such service providers as AirTouch, NYNEX and U S WEST.

The other standards-related efforts -- regarding service descriptions, system requirements, network reference models, radio to switch interfaces, intersystem operations, mobility management, and privacy and authentication -- have principally been addressed by the TR46 committee, with input from various industry associations, service providers, and manufacturers.

If the FCC attempts to select a standard for PCS and wireless generally, it will substitute fiat for a consumer-driven product, and risk freezing the technological environment. It may wind up choosing the wrong product, no matter how logical or justifiable the choice seems in the short-run, or it might contribute to other problems.⁴

² Telecom MobileNet's Telstra system manager was reported as favorably impressed by its trial CDMA system. See Mike Pickles "Regional Focus--Australia Paving the Way to a Truly Competitive Market," *Mobile Communications International*, Summer 1994 at p.54.

³ Information drawn from the U.S. Department of Commerce's Office of Telecommunications, September 1994 update of the World Cellular Market table.

⁴ This may actually increase the risk of delay, as any problem in the delivery of technology based on the selected standard may propagate throughout the industry, much as delay in the availability of technology for the Interactive Video and Data Services (IVDS) has engendered uncertainty in the IVDS market.

As Robert E. Litan, Deputy Assistant Attorney General in the U.S. Department of Justice's Antitrust Division observed in a speech on October 6, 1994, "the claim that the need for standards leaves little room for competition . . . is flat wrong."⁵

As Mr. Litan cogently argued, "we must assure that competition will continue to govern the development of standards themselves."⁶ Such competition between standards and would-be standards "is especially important in high-technology industries, where rapid innovation may create frequent opportunities for new standards to replace old ones."⁷ Mr. Litan stressed that "competition must remain as the central governing principle of the information age. Competition will best promote continued innovation. Competition will guarantee consumers the lowest prices for telecommunications and information services. And by securing low prices, competition is an essential means for promoting the availability of these services."⁸

In fact, during the Commission's PCS En Banc Meeting, held on April 11, 1994, Dr. Jerry Hausman observed that, while the delay of cellular had been estimated as costing the U.S. economy \$ 86 billion, a Commission attempt to choose a standard for the PCS industry could cost as much.⁹ Both Dr. Stanley Besen and Dr. Hausman expressed concern over a Commission attempt to establish standards "particularly given the highly fluid nature of market demand and technology here."¹⁰ Both Drs. Besen and Hausman recommended that any Commission role be limited to an oversight role of a private industry standards setting process.

Indeed, the private industry standards setting process is not causing any delay in the availability of products (infrastructure equipment or subscriber terminals). A range of products are currently available, and more have been announced as available in the first or second quarter of 1995.¹¹

⁵ Robert E. Litan, "Antitrust Enforcement and the Telecommunications Revolution: Friends, Not Enemies," Speech Before the National Academy of Engineering, October 6, 1994, at p.9. As *Mobile Communications International* has reported the observations of one member of Australia's regulatory body, "Austel's Bob Horton [has] stated, 'The development of consistent and compatible standards does not rule out future developments of air interfaces, e.g. CDMA, which may attach to the platform as time progresses and innovation proves itself.'" See *id.*

⁶ Litan speech at p.9 (emphasis in original).

⁷ *Id.* at p.10.

⁸ *Id.* at p.11.

⁹ En Banc Meeting on PCS Issues, April 11, 1994, Transcript at p.217.

¹⁰ *Id.*, remarks of Dr. Stanley Besen, Charles River Associates, Transcript at p.214.

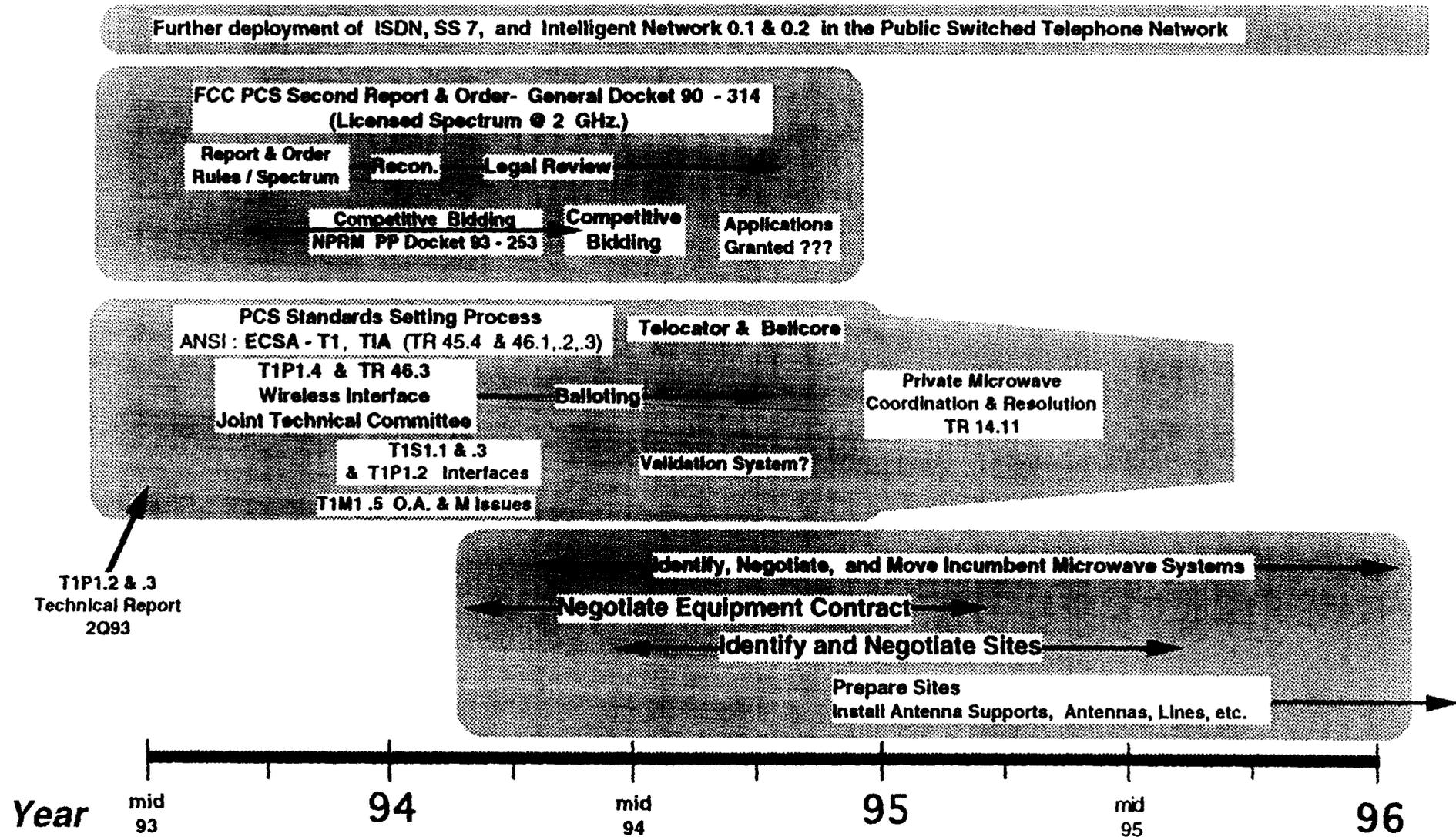
¹¹ See e.g., AT&T News Releases, "AT&T Announces High Mobility PCS Systems Based on North American Standards," February 24, 1994 (re 1994 introduction of TDMA-based Personal Communications Systems infrastructure components); and "AT&T Leads in Improving Digital Cellular Voice Quality," August 30, 1994, (re announcement of 1995-1996 availability of CDMA system components). See also Wolfgang Klein, "DCS1800 -- An Existing Solution for US PCS," *Mobile Communications International*, Summer 1994, at pp.62-63; and AirTouch Communications News Release, "AirTouch Cellular Makes First CDMA Calls In Los Angeles: First to Simultaneously Use Motorola, OKI and Qualcomm Phones," September 29, 1994.

The industry consensus is that commercial products are generally available 18 months after settlement on a standard.¹² Inasmuch as a choice of standards has been developed over the last two years, and notice has been given of the relevant spectrum bands for PCS services, the availability of both products and services should not be subject to untoward delay.

¹² This is consistent with projections made by manufacturers attending CTIA's PCS Integration Forum, held in Dallas, TX, on October 18-29, 1993. Many of these companies projected equipment availability in late 1994 and mid-1995.



2 GHz. PCS Time Line



T1P1.2 & .3 Technical Report 2Q93

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4TH STORY of Level 1 printed in FULL format.

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Telephony

September 26, 1994

SECTION: Vol. 227 ; No. 13 ; Pg. 7; ISSN: 0040-2656

LENGTH: 983 words

HEADLINE: Mapping out a general direction; PCS standards give bidders a good starting point; personal communication services; includes related article

BYLINE: Bernier, Paula

BODY:

As the Federal Communications Commission readied rules this summer for auctioning personal communication services licenses later this year, a joint technical committee of Committee T1 and the Telecommunications Industry Association was sorting through stacks of proposals that various industry players wrote up suggesting potential standards for PCS air interfaces. The joint committee, which consists of a subset of Committee T1's T1P1 subcommittee (T1P1.4) and a subset of TIA's TR46 subcommittee (TR46.3.3), has narrowed the initial pool of 17 proposals down to seven in the last few months.

It is possible that more than one of the seven proposals still on the drawing board will evolve into standards, but that is not to say that all will be widely accepted, explained Mel Woinsky, chairman of T1P1.

"It's unlikely that all of the standards will be widely deployed. The feeling is that we will have national consortiums of companies and these groups will pick one of the air interfaces to use," said Woinsky.

For example, the Bell Atlantic/Nynex cellular alliance--which Ameritech and Sprint are also rumored to be interested in joining--might go with one of the seven potential standards, while the AT&T/McCaw alliance might go with another. The point is, market forces will decide which of the standards actually come into play, Woinsky said.

But having some standards in place before the PCS auctions occur will give potential bidders an idea of what is available before they commit vast resource to obtaining expensive licenses. The FCC recently announced that auctions for 2-GHz broadband licenses for the A and B bands will start on Dec. 5 and run for several weeks. Auctions for broadband licenses in other bands are expected to begin in the spring of 1995.

"Committee T1 has met with the FCC in discussing our work," said Woinsky. "The FCC wants to make sure the players had some idea of what was possible in terms of the technologies."

There are two types of potential PCS standards: those for low-tier (smaller cell, lower power) applications and those for high-tier (larger cell, higher power) applications, said Woinsky. Individual ad hoc technical groups are working to formulate and finalize each of the seven options.

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Among the contenders for high-tier applications is a potential standard based on the existing TIA IS-95 cellular standard, also known as code division multiple access (CDMA). Of course, it would be a modification of that standard to work in the 2-GHz band, said Woinsky. Among the backers of this option are Qualcomm (the principal proponent of CDMA), AT&T, Motorola and Nokia. Some companies are supporting more than one of the options, Woinsky said.

Another is based on IS-54, which is the time division multiple access (TDMA) cellular standard. Among the supporters of this option are Ericsson, AT&T and Hughes.

A third high-tier option is known as PCS-1900, which is based on the GSM Pan-European digital cellular standard's air interface. According to Woinsky, IS-54 (option 2) was designed to work on top of the existing analog advanced mobile phone system (AMPS), so it used frequency division arrangements. But the GSM standard was "built from scratch" so it didn't have that constraint, he said.

"The AMPS uses frequency division multiple access where it's broken down into 30-kHz radio frequency channels. IS-54 kept that and put a digital time division on top of that," said Woinsky. "If you look at GSM, they wound up using 200-kHz RF channels and imposing time division on top of that."

Among the backers of the PCS-1900 air interface are Northern Telecom Inc., Ericsson, Nokia, Alcatel and Motorola. MCI and Pacific Telesis are the co-chair of the technical subcommittee in charge of working on this option.

A fourth high-tier option is wider band CDMA, which uses the 5-MHz band and imposes the code division on that band rather than 1.25 MHz which CDMA employs. InterDigital and Oki are among the proponents of this potential standard.

The fifth option uses the CDMA and TDMA and is being supported by Omnipoint, which received an FCC pioneer's preference for PCS based on its work on that technology.

There are two potential standards for low-tier applications. PACS, or personal access communications system, combines air interface specifications of the low-tier Japanese cellular Personal Handy Phone air interface and Bellcore's Wireless Communication Access System, said Woinsky. The TDMA-based PACS standard option is being backed by Motorola, Panasonic, NEC, Hitachi, Hughes and Bellcore, among others.

The other standard air interface option for low-tier applications is the TDMA-based Digital European Cordless Telephone (DECT) option. There currently is an unlicensed, in-building version of DECT. Companies that now use or are interested in using the unlicensed DECT system might find the licensed DECT option an attractive option because they probably could use the same handsets for both licensed and unlicensed systems.

After T1P1's next meeting, the group will have three proposals in a "stable state," meaning that the content of the documents is finalized and the proposal is ready for the verification and validation process, where documents are "cleaned up" but content is not changed.

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PCS-1900 has already been approved to start verification and validation. By early November the group may have five proposals in a stable state and one to five ready to ballot, Woinsky said.

THE PCS AIR INTERFACE STANDARD CONTENDERS

For high-tier applications:

- * A PCS modification of IS-95/CDMA
- * A PCS modification of IS-94/TDMA
- * GSM-based PCS-1900
- * Wider band CDMA
- * A CDMA/TDMA hybrid

For low-tier applications:

- * PACS, a TDMA-based hybrid of Japan's PHP and Bellcore's Wireless Communications Access System

- * Digital European Cordless Telephone, also TDMA-based

SIC: 4800 COMMUNICATION ; 4812 Radiotelephone communications

IAC-NUMBER: IAC 16137917

IAC-CLASS: Trade & Industry

LANGUAGE: ENGLISH

LOAD-DATE-MDC: October 21, 1994

DOCUMENT INDEX TERMS

1. Docket Number (7) 9 0 - 3 1 4
2. Rulemaking Number (8) _ _ _ _ _
3. Date of filed document (mm/dd/yy) (8) 1 0 / 2 7 / 9 4
4. Name of Applicant/Petitioner (last, first, mi (25) C E L L U L A R , T E L E C O M M
U N I C A T I O N S
5. Law Firm Name (25) _ _ _ _ _
6. Attorney/Author Name (last, first, mi (25) R O C H E , R O B E R T F .
7. File Number (20) _ _ _ _ _

FOR FCC USE

8. Document Type (2) _ _
9. FCC/DA Number (10) _ _ _ _ _
10. Release/Denied Date (mm/dd/yy) (8) _ _ _ _ _
11. Receipt/Adopted/Issued Date (mm/dd/yy) (8) _ _ _ _ _
12. Viewing Status (1) _
13. Ex Parte/Late Filed (1) _