Global Communications Newsletter

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– Activities Report –
Communications Standards Information Service Web Site: A Standards Information Site Sponsored by ComSoc (A Project of IEEE Mexico Section ComSoc Chapter).

Gerardo Chavez, Mexico Section ComSoc Chapter Chair

The ComSoc Standards Information Service is maintained by volunteers, initially from the Mexico IEEE Section, for the benefit of IEEE Communications Society members and other professionals and is part of the ComSoc Electronic Gateway Project initiative launched in 1998.

The Service provides a friendly and easy gateway to information on a number of important communications and communications-related standards, including introductory tutorial articles and links to other Web sites. This service is part of the Communication Society's Information Gateway to educational, research, and professional information for the communications community.

In recent years there has been explosive growth in the number of communication standards, new organizations born with each new standard developed by research groups, and "old" standards evolving to keep themselves "on-date" and available to industry. Trying to understand a single communication standard requires days or weeks of work, and possibly much difficulty finding a copy of the original documentation. To increase the participation and the discussion in new and old communication standards, the Communications Standards Information Service Web site intends to be the first choice of many professionals and students who require fast access to information about a specific standard and, most important, a list of recognized resources where they can find additional information.

The information is presented in a tutorial format, always providing the respective references and credits to the original information source. The authors emphasize the use of non-technical language and explain technical terms for those who may be confused. In addition, users of the Service are encouraged to contact the authors with comments or suggestions.

The site was built according to a third-generation design scheme, meaning it was designed in a non-linear way, matching the manner in which users access the information, "jumping" to any tutorial they desire with full access to all the references. As a result, users do not become lost in the site: they always know where they are, from where thay have come, and to where they might want to go.

Another important characteristic of the Service is its emphasis on references mainly to IEEE organizations to maintain the coherence between the Web site and IEEE. The site is structured as follows:

- Home page (www.comsoc.org.mx).
- Brief description of the service, the authors, and the objective.
- Tutorial section (important current standards). One of the three main sections is a collection of tutorials that follows the major trends in communications standards (ATM, Frame Relay, VoIP, etc.) Many of these tutorials have an annex and a glossary of terms.
- IEEE communication standards. To achieve coherence and to make available extra information to the official sites, the 802.x LAN/MAN Series are available on this Web site as short descriptions of all IEEE 802 Local and Metropolitan Area Network Standards Committees, always providing the official resource, as it may be a Web site or a bibliography.
- Related links section. This section is a database of hyperlinks to the most important organizations and sources of industry-related communication standards. There is also a "Top Selected" compilation of Standards organizations in areas such as video, teleconferences, magazines, etc.
- IEEE-related Web sites. This section is included in every page on the site. It will give the user the opportunity to follow IEEE projects related to this Web site.

Tutorials actually available are:

Network Technology (Wireless LAN).
IEEE 802.11.
Network Technology (COAX Cable).
IEEE 802.14.
Network Technology (LAN).
ATM.
Video Conferencing.
H.323.
Video Conferencing (Audio).
G.723.1.
Video Conferencing (Video).
MPEG.
Video Conferencing (Applications).
Voice over IP.
Video Conferencing (Applications).
Voice over Frame Relay.
Communication Protocol.
LDAP.

The site has been well received by the communications community. In the most recent statistics (first semester of 1999) the Web site served 3158 users and received between three and 15

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– Distinguished Article Series –
The Disappearance of Telecommunications: A Look at Telecommunications into the Next Century

Roberto Saracco, Italy

The next decade or two will be marked by communications, an "age of ubiquitous connectivity." Indeed, we have already seen an explosion in communications in the last century (cars, airplanes, radio, television, mail, phones) but we are now on the brink of a substantial change in communications. The "telecommunications" infrastructure is becoming a "skin" wrapping the whole earth and that is taken for granted by people and objects (people will represent a minority of the entities that communicate). And the sign of the success of telecommunications will be its disappearance.

Think, for a moment, about the roads you travel every day to school, to the office, or to the mall. How many times do you find yourself thinking: "Hey! There's a road"? Rarely. It's just human nature that the things we use every day as a part of our daily routines simply "disappear" from our perception.

Similarly, the new products and services that result from the convergence of new telecommunications and computing technologies will seamlessly integrate into how we do our work and live our lives. These new products and services also seem destined to become so familiar, so much a part of our environment, that they too will fade from our perception. For an in-depth look at the various aspects of the telecommunications world of tomorrow take a look at www.ieee.org/publications/authors/saracco.

The Blurring of Boundaries

The disappearance of telecommunications goes hand in hand with another development: the blurring of boundaries.

It used to be very clear: we had a transport network and an access network. On the customer side there were terminals. This is no longer the case. The distinction between access and transport has already blurred in terms of technology and it is getting blurred in terms of regulation (unbundling of the local loop, selling of bandwidth, etc.).

In the next 20 years we are going to see the blurring of the network's edges. Is a terminal outside of the network or is it part of it?

Think about a server: It is connected to the main network but it is providing (sometimes) connectivity services. And in the near future Web servers will be everywhere. You can get a Web server attached to a Web cam, and Web servers the size of a match box (with an equivalent price) have been announced.

And what, for that matter, is a terminal? We are going to have home networks creating an internal connected environment (fridge, oven, television, PC, rolodex, vacuum cleaner, bio-sensors, etc.) and using a host of external pipes to connect that environment with the world. What is a terminal in this scenario?

More than that: We are going to see tiny objects connected with one another to form a local network and then connect to some other local networks in an endless chain. Where is the backbone concept?

In the next decades we are going to have thousands of wavelengths carried over a single fiber (DWDM) and one can imagine that each wavelength can represent a single network.

And don't forget applications. An application is an object as any other and may have (use) a network to connect with other applications (and information, but this in turn is becoming an application itself). Applications can be physically hosted in a place or can roam or can even be nowhere-everywhere. (Distributed application and chain of application function providers: these are indeed creating logical networks that can be used as physical networks by higher-level applications.) Where can you place the boundary of these networks?

The blurring of boundaries may lead to a crisis in network management. The success of TMN (Telecommunication Management Network) is based on the concept of management domains and they may well disappear in the next decade or so.

As diversity and locality prevail there is a need to invent new management paradigms based on "act local-feel global," something that living creatures learned to do millions of years ago. Our kidney (managed object) does not send a message to the brain (manager) via the services of an agent (the epithelium of the tubules) using a dedicated network (nerves and chemicals in the blood). It just acts on the basis of its perception of the local situation. The message, if any, is not directed to a specific manager; rather, it creates new local contexts for all who may be concerned. And notice that this "message" is not at all a message in the normal sense. It is just an alteration of another local environment.

Look at the time-honored discipline of traffic engineering. The advent of the Internet and of unpredictable flows of traffic has changed the rules. We are in the transition phase from managing scarce resources to making use of abundance. Think of what happened to programmers. Thirty years ago they were designing compilers to optimize code length. A good programmer would know which instruction to use to save memory. Ask them today. Memory is no longer a scarce resource and they simply don't care anymore.

The Divergence

The motto of the last two decades was "convergence." Convergence of different technologies to support a seamless infrastructure; convergence of markets (entertainment, telecommunications, computers); convergence of companies (a new word was coined: M&A, merger and acquisition). This will continue in the next decade but the real emphasis will be on divergence. Many companies will be born out of an idea and the ease with which that idea can be spread through the network economy. New technologies will find little niches in which to grow and become stronger, and some of them will sweep the planet, causing the demise of existing technologies. Services will continue to appear and disappear in waves.

New infrastructures are already in the deployment stage and a few more will appear in the next decades. They will be flexible (IP-based in the next decade, maybe different in the second decade of the century) but they will also be customized to better serve specific markets.

Bluetooth-like local networks will spread, and wireless in general will become a very important infrastructure because of its relatively low deployment costs. It is not clear at this stage whether power lines may serve as a generalized access infrastructure or if, by the time the needed technology has reached maturity, some other cheaper and better technology will control the game. Local networks (both home and enterprise) will have a great impact in terms of service delivery and creation, changing the way we live. But they are likely to remain independent from one another, i.e., they will not form a network.

Divergence in terminals (many little objects will support specific functions rather than a single object, PC-like, doing all functions) with possibly the disappearance of the keyboard. This

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will happen not because a keyboard is not effective, but rather because it is too bulky to fit the various appliances that we will carry around with us. Voice interaction is going to be the dominant interface upstream while images may rule downstream.

Beyond 2020

Let's assume that by 2020 we will have this communication skin in place, all over the earth. Let's also assume it will be ridiculously cheap so that you won't notice its price. Wherever you are you won't notice the existence of telecommunications since communication, in whatever form, is part of your everyday experience.

Which projects will the research labs be involved in? Let's walk into one of them. Lab technicians are dressed in different ways, as you would expect in such an informal environment, but each of them is wearing a tag with their name. That tag will disappear as they walk past the lab doors. You realize that the tag is nothing but a video screen made up of special textile. That is common and very handy since you can change the color of your garment and the texture of the textile at will. But let's ask this technician what the challenges are:

"Well, these last 20 years have brought us virtual reality so perfect as to give you the impression of being there. You fancied a trip to the Egyptian pyramids and there they are. You can turn your head and look around, as though you were actually there. You can even smell the dates in the distance and your feet feel the desert sand. What we are after today is the creation of a real virtuality.

We believe that the power of our imagination should be put to good use and we let it create new environments that don't exist in reality but only in our mind. It is a little like what artists have been doing, seeing with their mind's eye and projecting what they saw onto a canvas or in a sculpture for the rest of us to see. You remember Leonardo, upon completing one masterpiece, saying: "Talk!" Even though the statue was so close to reality, it remained silent. Well, in the next few years we believe that a new Leonardo may indeed say "Talk!" but this time he will hear the answer.

Imagine having the power to translate whatever you are thinking about into real environments. Indeed, this is only the next logical step after computer-aided design and all the work that took place in the last two decades on translating bits into atoms. Virtuality will become something you can count on to such a point that it becomes real.

How long before realizing this goal? Probably some 30 years. By the year 2050 you will have virtual environments created in such a way that they become add-ons to the real ones and in a sense indistinguishable. What's more, communication will not just be the fabric holding each environment together: it will be self-constructed. Actually, it is this self-constructing capability that really opens the door onto the formation of these new environments.

We have seen at the beginning of the century, around the year 2000, the first steps toward autonomous self development and structure creation in areas as diverse as paint molecules organizing themselves to create patterns, to software agents creating clusters to deliver information. In the first decade, the explosion of telecommunications infrastructures has led to different paradigms for creating a self-awareness of the network as a whole. Later, smart dust particles have started communicating, effectively creating local environments."

One may wonder how it would feel living in a world where communication creates worlds. But what if these new worlds are starting to compete with us? Artificial Intelligence was a main target in the second part of the nineties but it was sadly (happily?) discovered that it was indeed an evasive one. The more steps taken, the further away completion of the quest was. In the last two decades (starting from the year 2000) some real progress in having some sort of usable intelligence was achieved. Today we are close to having appliances as smart as an ant. By having all of them communicate with one another we can hope to have some interesting "intelligent" behavior.

Beyond the year 2050, however, the increased connectivity among millions of local intelligence forms and their weaving into a fabric with billions of them are likely to result in something as smart as us. Which, of course, is a problem. It may mean the beginning of the age of "competing intelligence." Now it may also be that we can continue to have the upper hand since our intelligence will have progressed because of the better learning facilities, and also because of the e-supplements that we will have on our body. A nice microchip connected to our brain may boost its capability to tame an ever more complex environment.

Nonsense. Absolutely, but I hope it was sort of fun though.

ComSoc's P1520 Standards Working Group Sponsors Pavilion at TELECOM '99

Steve Weinstein, Raguparan Masilamany, Jit Biswas

ComSoc's P1520 Working Group on Programming Interfaces for Networks broke new ground when it sponsored a pavilion at the huge TELECOM '99 exposition in Geneva in early October, 1999. Seven companies participating in P1520 work co-sponsored Stand 8134 to demonstrate the potential of the future IEEE 1520 standard. Bell Atlantic, France Telecom, Hitachi, Kent Ridge Digital Lab (KRDL, Singapore), NEC USA, Nortel Networks, and Xbind (USA) provided posters and (for some of the companies) demonstrations to show that "open" network elements, accepting a wide range of services controllers realized in remote software, are a developing reality in the communications industry. This openness flows from definition of programming interfaces for switches and routers that represent abstractions of the functions of those network elements. Network operators will be able to rapidly deploy new services and benefit from a large market of control and management software packages written to those interfaces by many third-party software providers. Four of the companies had active demonstrations at Stand 8134.

France Telecom demonstrated control of ATM switches through IP networks, providing new flexibility in ATM connection setup without the use of ATM UNI (user-network interface) signaling. KRDL offered an illustration of easy installation and use of Internet Differentiated Services (DiffServ) on a programmable router platform. NEC USA showed an "intelligent router" programmed with third-party "Guest IP" software that sets up a plug-and-play IP service for visiting laptop computers brought to a host network. Xbind, a recent start-up company offering commercial products, demonstrated use of parallel IP and ATM networking for elements of a multimedia session, with the ATM

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Telecommunication Engineering Studies in Spain

By Joan Garcia-Haro, Spain

In the March 1996 issue of *Global Communications Newsletter* an article was published entitled "Educating Engineers for Telecommunications in Spain." It explained how to obtain the official Telecommunication Engineer University Degree, the difference between the Superior and Technical degree, and described the first and second cycles and the third cycle of studies mainly offering Master and Ph.D. programs. Also, it briefly described some topics of the study plans, the Spanish universities where these studies are offered, and data about collaboration and double degree validity with many European and North American universities.

At present, that information must be updated, mainly because new universities were created and some type of competition to offer telecommunication studies between them also occurred.

First, it must be stated that the creation of universities, in most of the cases, is associated with the development of the Spanish political process giving more autonomy to the Autonomous Regions into which the Spanish State is administratively divided. Also, this writing is restricted only to public universities, even though some private universities of prestige were created, it is still admitted that public institutions dominate the university system in Spain.

Currently, two telecommunication engineering studies are possible at the university level: one superior (Engineer of Telecommunication) consisting of a five-year degree plus a career final project; and a Technical Degree that emphasizes practive over theory. The technical studies include one cycle of three academic years and a career final project. The title is Technical Engineer of Telecommunications and there are four specialties: telecommunication systems, electronic systems, sound and image, and telematics.

A complete list of the different universities offering these studies and links to them can be found at http://www.mec.es/consejou/ The list is lengthy, but it may be divided into polytechnic and generalist universities. Usually, polytechnic universities comprise technical and technological studies related to engineering (civil, electrical, industrial, telecommunications, agricultural, mining, etc.). Generalist universities also impart other studies associated to humanistic careers, laws, medicine, mathematics, physics, etc. Obviously, there are centers of excellence in both sets of universities. However, polytechnic universities are more sensitive to technology and the sharing of available resources, and the infrastructure is built according to the particular requirements and necessary budget to equip the different laboratories for the diverse specialties. In a generalist university this sharing is balanced among all the degree areas, blurring the specific necessities of the technical studies.

In Spain, there are only four polytechnic universities, three of them (the Polytechnic University of Madrid, Catalonia, and Valencia) are well established and have operated for several years or decades. The fourth, the Polytechnic University of Cartagena, was recently created and some of its courses started in 1999. It is located in an interesting industrial and military environment. The city of Cartagena has an important harbor on the Mediterranean sea and the main economic sectors of the area are related to tourism, energy industries (gas, petrol, electricity), plastic manufactures, ship engine construction, military industries, etc. All these require technological development, telematic services, research, innovation, and a close collaboration with the University. This gives the Polytechnic University of Cartagena a unique character and prospects for a productive future.

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www.comsoc.org/pubs/gcn

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P1520 Working Group/*(Continued from page 3)*

switch controlled through the IP network. Visitors to Stand 8134 were able to see these demonstrations, staffed by the engineers and computer scientists who actually developed them. This initiative of the P1520 Working Group demonstrated successful international cooperation, within the ComSoc community, in showing the importance of IEEE standards and the growing role of the IEEE Communications Society as a standards facilitator. Further information about the IEEE P1520 Working Group is available through the Web site http://www.ieee-pin.org

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e-mails monthly. The site has been restructured twice and the tutorials are updated constantly (referring links and content). (Statistics available by request from epena@ieee.org.mx

This policy of keeping the site updated is a commitment that all staff involved in this project takes at the beginning. This Web site helps our engineering students follow the major trends in communications and gain access to extra academic information. The site also helps professionals keep updated in our career to gain more knowledge and provide better service to our community.

I would like to extend my special thanks to Mr. Eduardo Pena, Webmaster of the site, for his invaluable contribution to support and enhance this important gateway with all of our IEEE ComSoc community.