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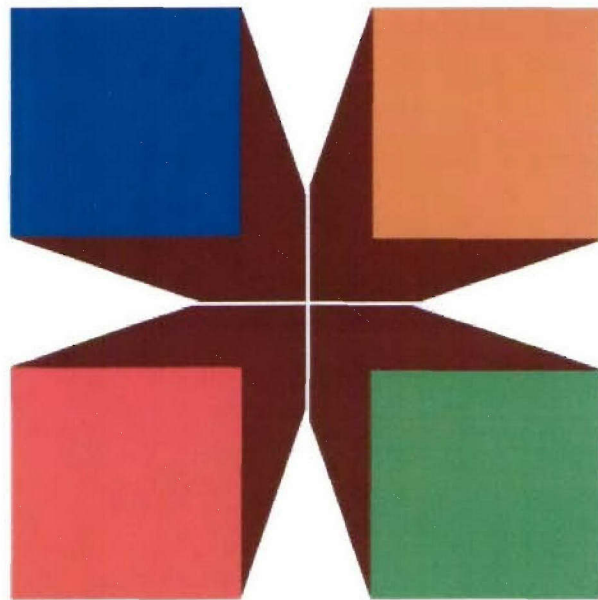
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**Conference Proceedings of the
FirstMile.US Fall 2005
Conference**

firstmile.us



**big broadband
everywhere**

**FirstMile.US Fall 2005
September 14, 2005
L'Enfant Plaza Hotel
Washington DC**

FirstMile.US Fall 2005 Conference Proceedings

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September 15, 2005

Broadband Daily
News & Analysis

Cerf Predicts Rising Use Of Geographic Information Via Broadband

By Paul Dykewicz

A key application for mobile users that seems destined to rise is information about the geographic location of device users or their intended destinations, said Internet pioneer Vinton "Vint" Cerf, who announced earlier this month that he would leave his technology leadership post at MCI to become Google's chief Internet evangelist.

Mobile devices are enabling Internet applications and the use of geographic information is destined to find a niche, Cerf said. Cerf, who co-designed the TCP/IP protocols that were used to develop the Internet's underlying architecture, offered his forecast during an interview following his formal remarks as a keynote speaker Wednesday at a day-long Internet conference in Washington, D.C., sponsored by FirstMile.US, an advocacy group that supports the development of improved broadband services in the United States.

The users of mobile broadband devices would be able to find the nearest hospital, ATM or bank, Cerf said. He described the application as "geo-indexing" and predicted that it would have many practical uses in the future.

Cerf also predicted that consumers increasingly would not require real-time applications, despite forecasters who believe the opposite. The increasing popularity of TiVo and other video recording services show that people are enjoying the opportunity to download broadband content and watch it when they want rather than when it is aired in real-time, he explained during his presentation.

"Only breaking news and maybe sports need to be broadcasted in real-time," Cerf said. As long as the capacity for downloading content is available, most of the requirements of consumers will be met without real-time viewing, he added.

One delivery mechanism of multicasting that should gain increased use is satellite radio, Cerf said. "Satellite is more likely to be the medium for IP multicasting than terrestrial radio," predicted Cerf, who added that he was not too optimistic about wireless-based IP broadcasts.

Upon officially joining Google Oct. 3, Cerf said that he expects to fulfill as role as a technology "bumble bee" who would visit the company's laboratories and intellectually challenge employees to solve problems in hopes of developing new applications. There is no lack of ideas, added Cerf, who said he did not expect to be given responsibility for directly managing any engineers.

"Google has done a remarkable job of marketing its services for the network," Cerf said. His role would involve getting into the details of the company's technology developments and looking for ways to add value to the process, he explained. Among the areas that Cerf said he might probe are Google's design philosophies, as well as its technology parameters and assumptions.

One specific area of interest for Cerf is voice-enabled technologies, he said.

"Today's Google searches would not work well in a spoken environment," Cerf said. "There are places in the world where people are not literate but they can speak."

Google CEO Eric Schmidt, who has known Cerf for roughly 20 years, described him as a technology visionary when the company announced on Sept. 8 that he would be joining it. Cerf will help Google build network infrastructure, architectures, systems and standards for the next generation of Internet applications, according to the announcement.

At MCI, Cerf led the company's technology advancements since 1982, with a break to return to research at the Corporation for National Research Initiatives from 1986 to 1994. Upon returning to MCI during 1994, he helped to guide the company's Internet initiatives. With Robert Kahn, Cerf recently received the ACM's A.M. Turing Award, which is described in Google's announcement as the "Nobel Prize for computing." Cerf also is working on the Interplanetary Network, a project of NASA's Jet Propulsion Lab, which intends to extend the Internet into outer space for planet-to-planet communications.

September 16, 2005

Broadband Daily
News & Analysis

Killer App Still Eludes Broadband Industry

By Paul Dykewicz

The elusive search for a killer application that would propel the broadband industry forward sparked lively discussions about delivering entertainment, educational content, and healthcare information, but no answers, during the one-day conference held Sept. 14 in Washington, D.C. by advocacy group FirstMile.US.

No single application has attracted an overwhelming demand from the marketplace. However, private sector entrepreneurs and public sector officials alike are rolling out new applications aggressively to seize upon the enhanced capabilities offered by high-speed broadband.

Entertainment content increasingly aimed at technology-savvy youth is finding the Internet to be a viable substitute for carriage on traditional television. In some cases, entertainment content can be offered on the Internet as a core delivery method that is supplemented when it is aired on local or national television channels.

Dave Yanofsky, director of programming at UthTV, of Redwood City, Calif., said his organization has turned to broadband as the primary distribution outlet for its youth-oriented programming. However, it also has aired 12 shows on the UPN channel in San Francisco and is trying to take its distribution national.

Young people are adopting and using digital media tools as a "new language," he added.

"The reality is the distinction between TV and computers is blurring," Yanofsky said. "Youth spend more time using computers than watching television."

Broadband also allows the cost-effective online collaboration with other members of a creative team who may be spread around the world, said Jeff Fino, co-founder of Wild Brain, a San Francisco-based animation studio that develops and produces content for the global film, TV, commercials and interactive markets.

"Our biggest client for wireless broadband is Japan," Fino said. The proliferation of cell phones in Japan has developed an enormous market for mobile broadband content to become a killer application there, he added.

"Young people are the ultimate broadband consumers, users and hackers," Ken Ikeda, executive director of Youth Sounds, an Oakland, Calif.-based media and arts organization that provides youth with opportunities to share their stories through programs in video, audio and music production. "Young people are adept at technology and they have it in their hands."

For young people, broadband viewing is just as "legitimate" as television, Ikeda said. In the San Francisco Bay area, there are plenty of computers and broadband access, even in poor areas, he added.

Barrett Fox, another speaker on the conference's entertainment panel, is a character animator who has worked in developing video games and twice has served as the technical director of startups.

"There is a lot of movement going on in the use of video games for education," Fox said. Rich content delivered with high-speed broadband can show quality video similar to what one might expect from a movie, he added.

ESPN, for example, is working to put animated versions of its own announcers in video games to let them "broadcast live," Fox said.

"Video will be the new document," said Joaquin Alvarado, a faculty member at San Francisco State University, who moderated the conference's panel discussion about entertainment. "People will need to be able to deal with it and interact with it."

The Internet will be delivered by a wide variety of means and go to places where people may not have access to broadband, said Internet pioneer Vinton "Vint" Cerf, another speaker at the event who is leaving his technology post with MCI to join Google as chief Internet evangelist.

"Be careful not to only design applications with broadband quality," Cerf said during an interview after his keynote address. "Build systems that are open sourced at a wide range of speeds."

As far as reaching young people, the new generation expects to have more control of the entertainment content that they use, Cerf said. In the past, a movie was not stopped until it finished airing in real-time but recorded media now allows video to be watched when a user wants, he added.

Education uses of broadband also are on the ascent but not taking flight as quickly as profit-generating entertainment content.

"In higher education, big broadband is not an option, it is an imperative," said Steve Corbato, director of network initiatives and managing director of technology direction and development at Provo, Utah-based Internet2, a consortium led by 207 universities that works with industry and government to develop and to deploy advanced network applications and technologies. Indeed, many potential science applications require that the Internet work three or four times faster, he added.

One problem in developing education applications is money. Speakers on the education panel highlighted successful uses of broadband to aid education that included examples in New York, Ohio and Virginia, but none of those initiatives could be described as a killer application.

Steve Brand, chief imagination officer at One Cleveland, said his organization obtained donated fiber in a 17-county area of northeastern Ohio that is used to send broadband content from museums, art institutes and the world-renowned Cleveland Clinic. One Cleveland has received cooperation from local cable companies and is in the process of trying to develop the same supportive relationship with the regional telephone company, he added.

Healthcare also offers another avenue for using broadband to good advantage but it presents an additional cost when efforts are on the rise to slow spending rather than increase it.

Another impediment is that real-time telemedicine requires "symmetrical broadband," said Michael Ackerman, a presenter on the healthcare panel who is an assistant director at the National Library of Medicine in Bethesda, Md. Existing real-time applications include teaching human anatomy and surgery, as well as showing the condition of a patient to a doctor in a faraway location to assist with medical care.

Broadband can be used to aid with the delivery of medical assistance to injured soldiers in war zones, said Gary Gilbert, another member of the healthcare panel who also is chief of the knowledge engineering group at the Ft. Detrick, Md.-based Telemedicine & Advanced Technology Research Center (TATRC), a division of the U.S. Army Medical Research and Materiel Command. Such applications are expected to expand in the future as technology allows, he added.

Bio-defense distance learning is a major area of interest, said Conrad Clyburn, special assistant to the director at TATRC. Broadband is used to integrate partnerships between academia, industry and government, he added.

Medical procedures require ubiquitous, high-quality broadband service, Clyburn said. Simulated surgeries have been performed via broadband, he added.

An Introduction to FirstMile.US

Susan Estrada, FirstMile.US



An Introduction to FirstMile.US

Susan Estrada, President

susan@firstmile.us



The First Mile Philosophy

- Titus Moetsabi, an African, developed the idea of communities as being at the first mile of connectivity.
 - Connect yourself to the rest of the world and all it has to offer.



The time has come for action

shouldn't your children receive
the best education possible—
no matter where you live
or how much money you have?

sick and tired of watching our nation
lose the broadband race?

shouldn't EVERYONE have access
to the latest in e-healthcare—
something that could lower costs?

why can't YOU choose where and how
you get your information
and entertainment?



Our Mission and Vision

- Mission: To educate, advocate and focus the debate on the power and promise of big broadband in the United States
- Vision: Every member of the American public has access to big broadband, the 21st century pathway to a better overall quality of life



The Dichotomy of Agendas

- Everyone believes
- But, everyone has their own agenda
- Find the common points in the agendas and make forward progress



Subcommittee by Tony Cragg



An Introduction to FirstMile.US

Susan Estrada, FirstMile.US

Big Broadband? What's that?

- There are variety of broadband connection characteristics that allow great strides in the types of applications used.
 - size of the bandwidth
 - latency (bottlenecks)
 - symmetry (same bw in both directions)
- It's a sliding scale based on time.
 - Most experts agree that we need at least 100 megabits of broadband bandwidth to support the kind of applications we expect in the next five years. Some have even suggested that one gigabit of bandwidth is essential by 2010.
- *Fact: usability studies show a goal of 300 ms response time for any application but no longer than 1 second.*



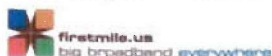
Primary objectives and purposes of FirstMile.US

- Building market demand for big broadband services
 - Building public awareness of the importance of big broadband
 - Catalyzing a grass-roots legion of big broadband evangelists nationwide

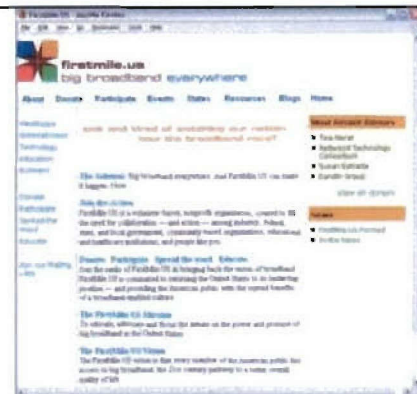


How are we going to build demand?

- Provide electronic communications via the web to support online collaboration tools such as discussion blogs, resource listings and event locations
- Host face to face meetings, conferences, seminars and workshops to educate the general public on big broadband
- Provide briefings to help policymakers understand the impact of their policies on the deployment of big broadband
- Build online toolkits for advocacy, community readiness, and others as needed
- Engage in other activities related to educating the public about big broadband issues and concerns



FirstMile.US has adopted a Web-based outreach strategy organized by state and our focal areas of healthcare, entertainment, technology, education and business.



Big Broadband Bill of Rights

- A discussion document meant to help people understand the components of broadband
 - Pipes
 - Applications
 - Devices
 - Policymakers



Planned Activities

- Public Awareness Toolkit
 - Simple, easy-to-understand strategies for explaining the value of big broadband to every member of the American public
- Community Building Toolkit
 - "How To" guides to create a first mile vision in your community
- Top 50 Contests
 - Feature top 60-second videos that embody our big broadband vision



An Introduction to FirstMile.US

Susan Estrada, FirstMile.US

Sources of Funding

- **Founding Circle Drive – Ends December 1**
 - The Founding Circle Drive has key volunteers raise funds through corporate and individual contributors. Partners and donors are recognized in numerous ways for the valuable role they play in the organization. We anticipate the drive will cover the start-up expenses.
- **Partner Program - Ongoing**
 - FirstMile.US Partners stand out from the crowd – and show the world that they are visionaries in the big broadband world. Any organization or individual that wants to demonstrate their commitment to the goals of FirstMile.US is encouraged to become our Partner.
 - Becoming a FirstMile.US Partner makes it easy to give and participate at the same level as your colleagues.
- **Grants - Ongoing**
 - FirstMile.US is pursuing grant opportunities to fund targeted projects as well as the planned activities listed earlier.



Organization

- California public benefit organization
 - Currently working on 501c3 paperwork
- Volunteer-based
- Board of Directors
 - Comprised of a group of individuals with deep broadband beliefs
 - Jim Baker
 - Steve Corbató
 - Susan Estrada
 - Dewayne Hendricks
 - Lynn StAmour
- Staff
 - Currently volunteer
 - Susan Estrada, President
 - Concordia Chen, Webmaster
 - Julie Van Fleet, Government Relations



Next Steps

- **Donate**
 - Invest in the future of big broadband by investing in FirstMile.US
- **Participate**
 - Blogs, events, resources, mailing list, web
- **Spread the Word**
 - Tell others about FirstMile.US and big broadband
- **Educate**
 - Create a First Mile vision in your community



Is Entertainment the Killer App?

The first session of the day was the entertainment panel. The panel was moderated by Joaquin Alvarado, from the Institute for Next Generation Internet at SFSU [<http://www.ingi.org>]. Panelists included Jeff Fino, co-founder, WildBrain; Barrett Fox, Animator, BarrettFox.com; Ken Ikeda, Executive Director, Youth Sounds; Dave Yanovsky, Executive Producer, UthTV.

Wild Brain, Inc. [<http://www.wildbrain.com>] is an award-winning animation studio that develops and produces content for the global film, TV, commercials, and interactive markets by using pioneering digital technology along with traditional artistry.

Youth Sounds [<http://www.youthsounds.org>] is a nationally recognized media and arts organization dedicated to providing youth with opportunities to share their stories through programs in video, audio and music production. Founded in the Fall of 2001 by Ken Ikeda, Youth Sounds began as an after-school drop-in program at McClymonds High School in Oakland, CA. Since then it has worked with thousands of youth in Bay Area high schools and public housing sites nationally. Their programs range from introductory lessons in storytelling and production to advanced and professional employment. They are committed to providing a comprehensive experience for our youth, from idea- to product- to marketing and distribution. Youth can transform themselves and the world through the work they've produced.

UthTV [<http://www.uthtv.com>] is an outlet for the next generation of storytellers. UthTV empowers teens to become media producers. With digital video cameras and editing software so accessible, talented young filmmakers can now be found in every corner of the country. But instead of having only a handful of people see their work at a school assembly, youth film festival, or in their families' living room, Uth TV can air the piece on a UPN station and reach hundreds of thousands of teenage viewers. Originally slated to be a cable channel, UthTV has found its niche as an online broadcast medium and has found it to be much more cost effective than a cable channel.

Barrett Fox [<http://www.barrettfox.com>] is an animator who has worked on video games. He is currently involved with the Brainstormer Project, an educational tool built on an existing video game engines. [http://www.barrettfox.com/Brainstormer_Project.pdf]. The application allows users to create characters with auras that allow for idea sharing. The project can be used for collaboration, Distance Education and Distance Production. For more information, contact fox@barrettfox.com

Fox mentioned an event for those interested in serious game development called The Serious Games Summit [<http://www.seriousgamessummit.com/home.html>]. The Summit will be held in Washington, DC October 31-November 1, 2005. The Serious Games Summit is a unique, two-day event that provides:

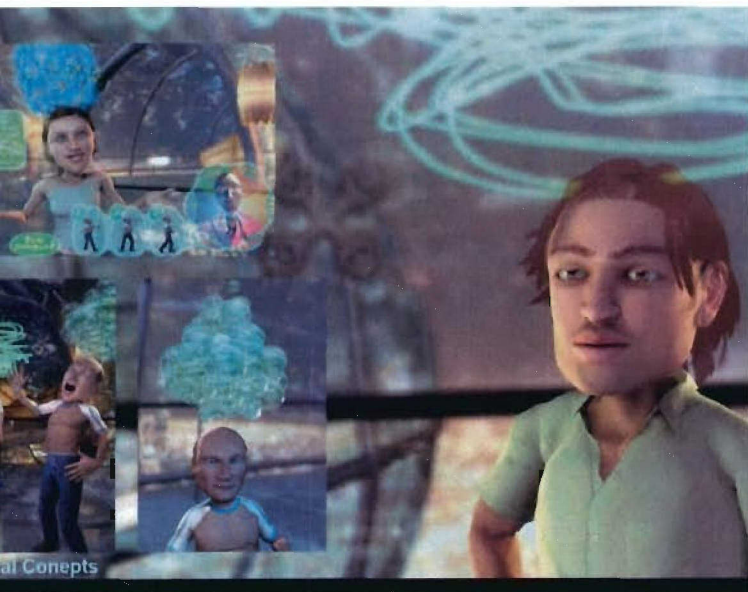
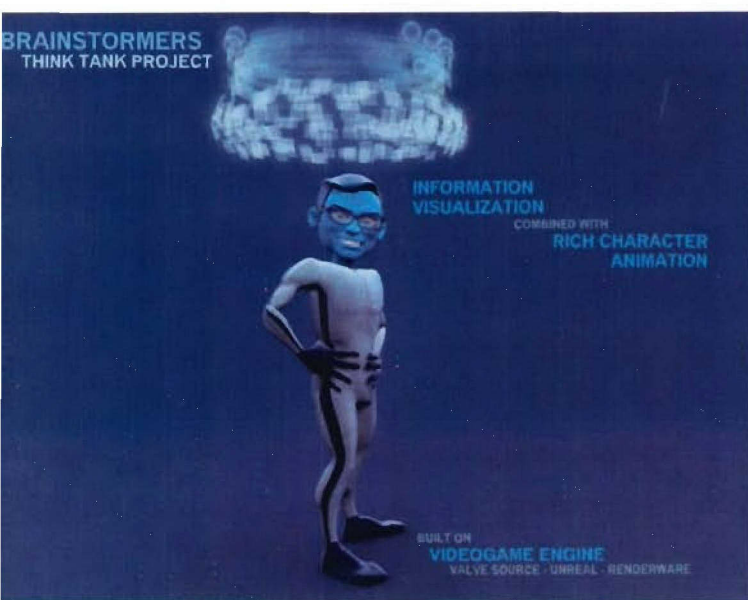
- Developer training and education specific to serious game creation
- 40+ dynamic sessions, lectures and roundtables discussions
- Showcase of next-generation serious games efforts

It will explore and demonstrate how games are being used in all industries – education, government, healthcare, military, corporate, first responders, science.

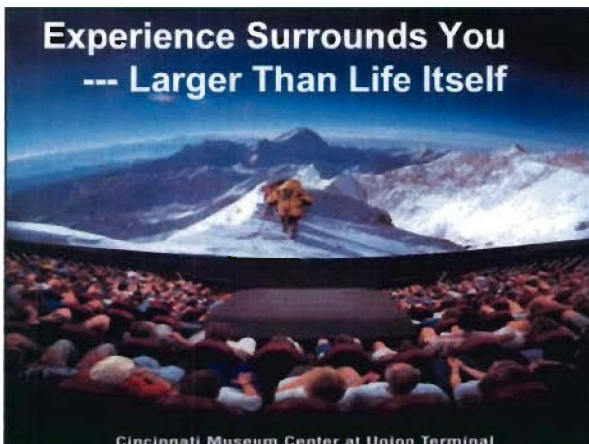
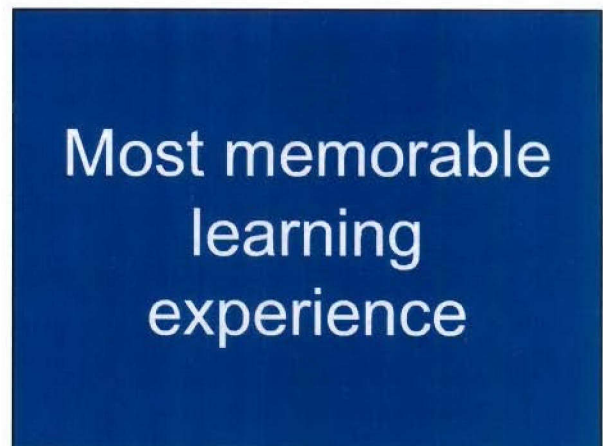
Brainstormers Think Tank Project

Barrett Fox

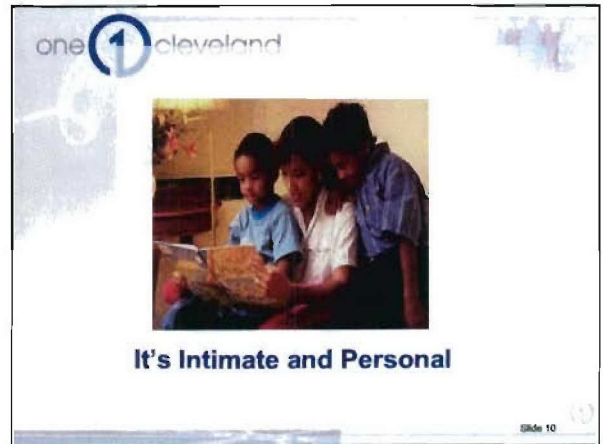
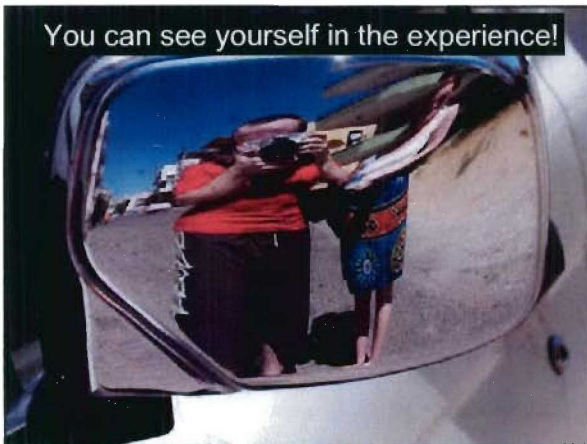
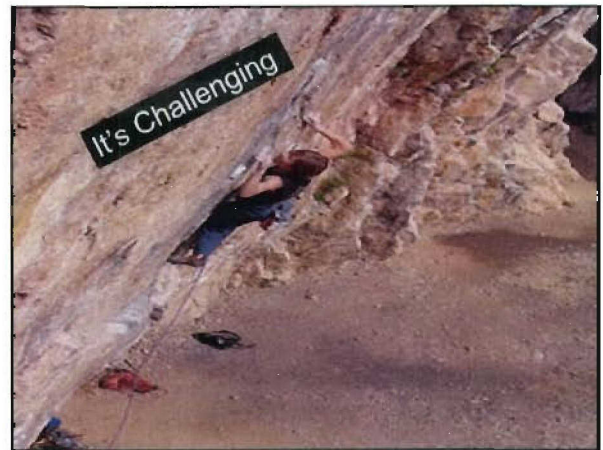
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First Regional Community Network –
OneCleveland
Steven Brand, OneCleveland



First Regional Community Network – OneCleveland Steven Brand, OneCleveland



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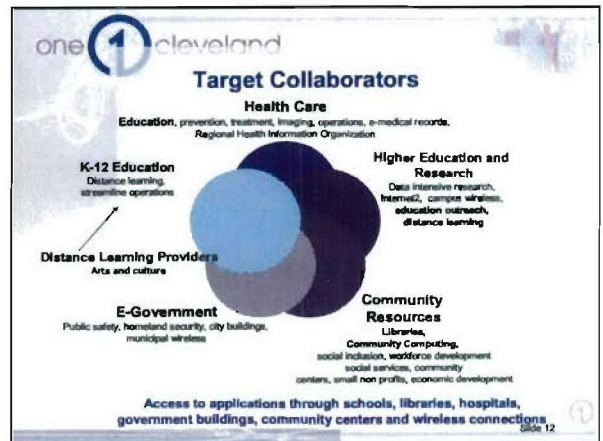
Mission: Enable our Region's Imagination
A provider of application-based, information services that foster collaboration and innovation

Connect our next-generation big broadband network to the region's treasures – including schools, universities, researchers, healthcare providers, government agencies, social services, arts and culture, and other non-profits.

Enable new ideas, approaches, capabilities, services, collaborations, models, products, applications, tools and innovation.

Transform how we live, learn and work. And how we deliver services to our community. Expand collaborations, share community assets and resources, invest, partner, innovate and drive economic development.

Slide 11



First Regional Community Network –
OneCleveland
Steven Brand, OneCleveland

Killer App???

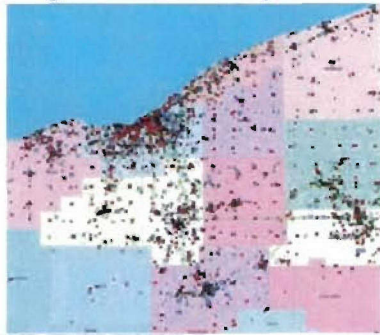


Killer App



The Community

A Regional Community Network



Slide 15

Approach

- Make fiber connection affordable
- Seed imagination
- Connect for-profit to non-profit
- Convene and cross fertilize
- Stand back or hold hands
- Establish a sandbox for national tech R&D – and beyond
- Stay lean and outsource

Slide 16

Signed Subscribers (as of 7/1/05)

What's the Opportunity?



Slide 17

Strategic Partners



Slide 18

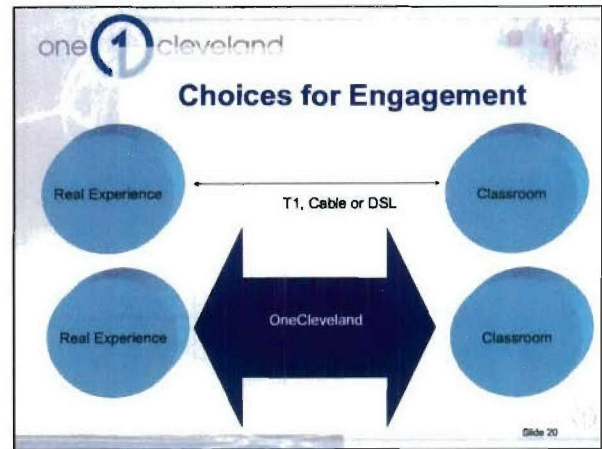
First Regional Community Network – OneCleveland Steven Brand, OneCleveland

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Education Content Providers

- Ideastream
- Cleveland Art Museum
- Cleveland Institute of Music
- Cleveland Orchestra
- Akron Art Museum
- Cleveland Zoo
- Cuyahoga County Library System
- National Inventors Hall of Fame
- Great Lakes Science Center
- Western Reserve Historical Society
- Case Math and Science Education
- NASA
- Rock and Roll Hall of Fame
- Natural History Museum
- Etc. . .

Slide 19



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THE CLEVELAND CLINIC

Linked and linked together by OneCleveland in the region and in the world.

Cleveland Municipal School District

The Cleveland Clinic Foundation
Links 117 Cleveland Public Schools to OneCleveland



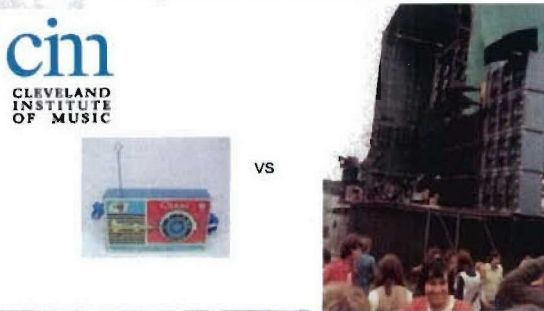
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Impact of Bandwidth

cin
CLEVELAND INSTITUTE OF MUSIC

VS

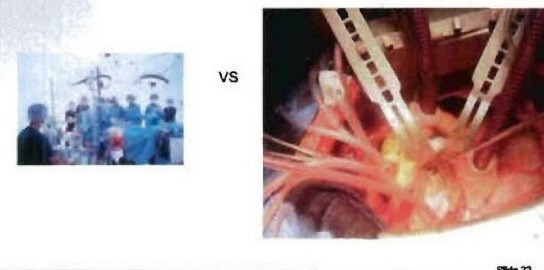


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THE CLEVELAND CLINIC

Linked and linked together by OneCleveland in the region and in the world.

VS

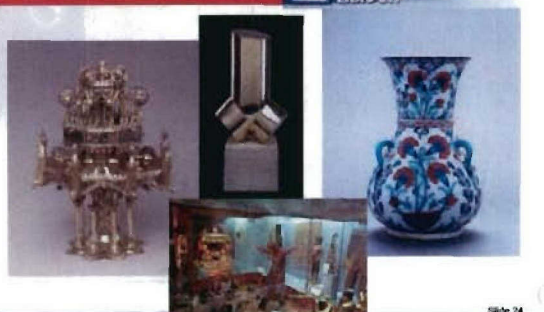


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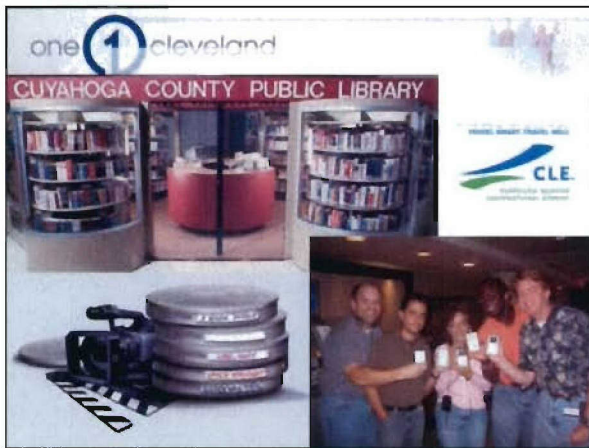
THE CLEVELAND MUSEUM OF ART

PUBLIC LIBRARY



Slide 24

First Regional Community Network – OneCleveland Steven Brand, OneCleveland



one 1 cleveland

Community Computing

- Thin Clients
- Digital Asset Management System
- Low cost maintenance
- Community Resource Portal
- Libraries
- Schools
- Social Service Agencies
- Digital Assets for Education
- Downloading Books and Videos
- Airport – Tourism
- Senior Centers

Slide 26

one 1 cleveland

Top Worldwide Digital Community

"OneCleveland Propels Northeast Ohio to Worldwide IT Leadership" (8-18-05)

- Intel, IBM and Cisco select OneCleveland as *one of top three Worldwide Digital Communities along with Taipei, Taiwan and Corpus Christi, Texas*
- First pilot project launches wireless e-government services for the City of Cleveland's building inspectors and other mobile workers, reducing permit wait times from months to days
- Digital Communities Program provides various resources to support innovative use of cutting-edge community technologies

Slide 27

one 1 cleveland

Strong Recognition for the Region

The New York Times Finalist for Top 7 International Intelligent Community Of The Year

InformationWeek wireless

THE WALL STREET JOURNAL BUSINESS 2.0

CNN.com Top 3 Finalist for International Visionary Community Of The Year – ICF

Finalist for Best International Application Of The Year

COMPUTERWORLD Finalist for Ernst & Young Entrepreneur Of The Year®

10020

washingtonpost.com

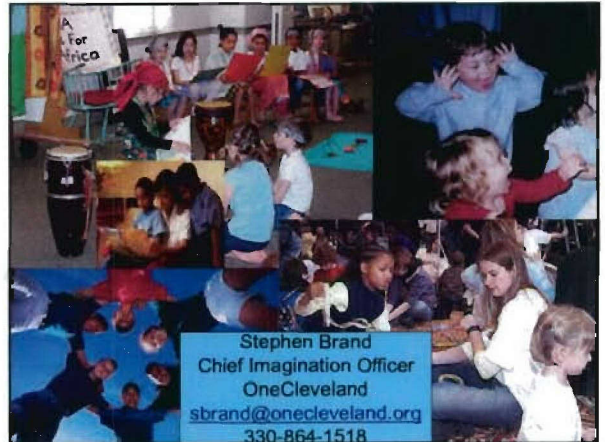
MuniWireless.com

Creating
Memorable Learning
Experiences

The Challenge



**First Regional Community Network –
OneCleveland
Steven Brand, OneCleveland**



Big Pipes, Emptying Pipes

Tim Lance, NYSErNet

Big Pipes, Emptying Pipelines

FirstMile.US Fall Conference
September 14, 2005

Tim Lance, NYSErNet

A prime p is said to be regular

$\iff$ the ring of Gaussian integers mod p has the unique factorization property

$\iff p$ does not divide the numerator of any Bernoulli number B_k

The Bernoulli numbers are defined by the series

$$\frac{x}{e^x - 1} = 1 - \frac{x}{2} + \frac{B_2}{2!}x^2 - \frac{B_4}{4!}x^4 + \frac{B_6}{6!}x^6 - \dots$$

A prime is irregular if it is not regular. The smallest irregular prime is 37 which divides the numerator of B_{36} .

2

A little bit about NYSErNet

NYSErNet is . . .

- the research and education network in New York State
- the Internet2 gigaPoP in NY
- a 501(c)3 not-for-profit
- a membership organization
- financially self-supporting
- long-lived (since 1985)
- dedicated to the R&E community (no commercial customers)

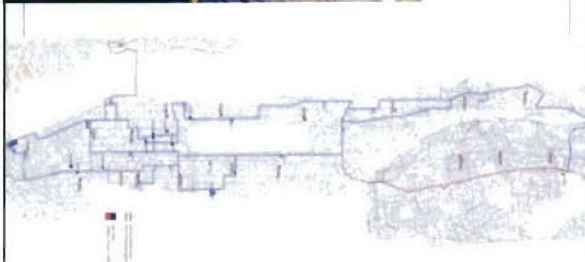
NYSErNet is not . . .

- large (staff of 14)
- a state agency
- an ISP (we resell commercial ISP service)
- a carrier or CLEC

3

New York City Dark Fiber Project

Manhattan Dark Fiber



22 sites — 1,528 miles of fiber. . .

5

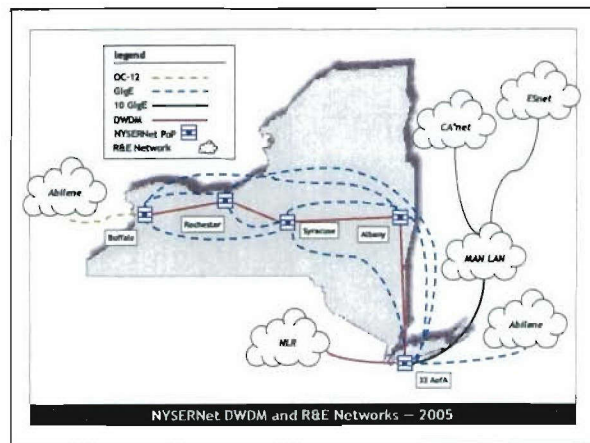
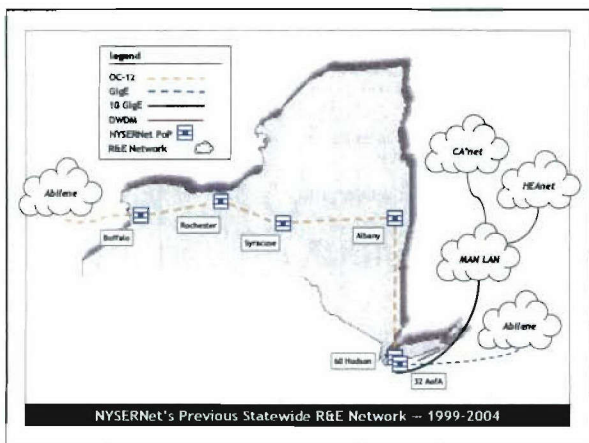
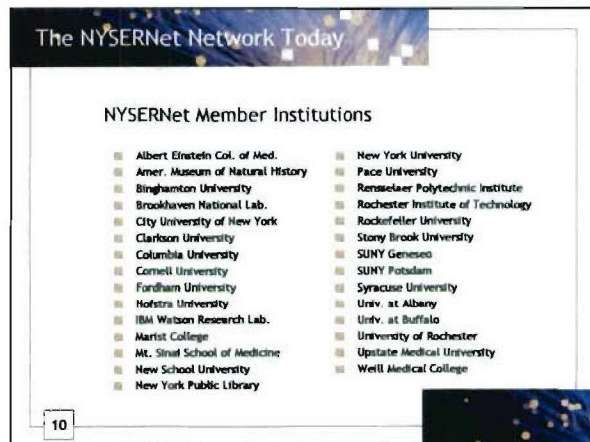
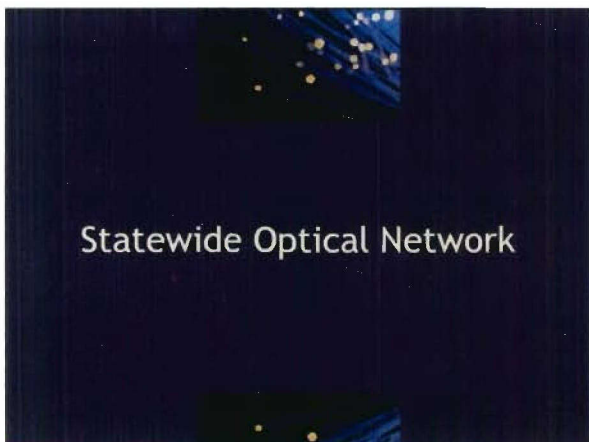
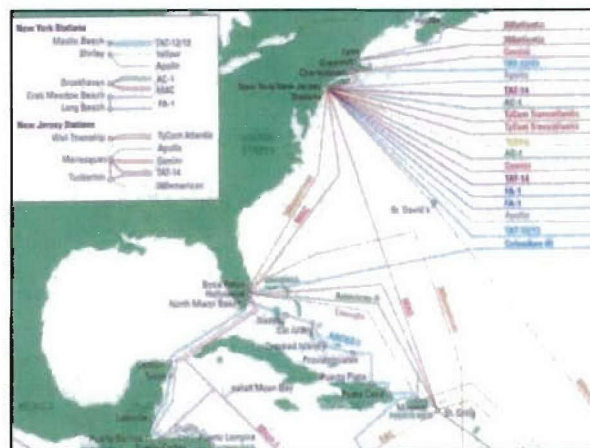
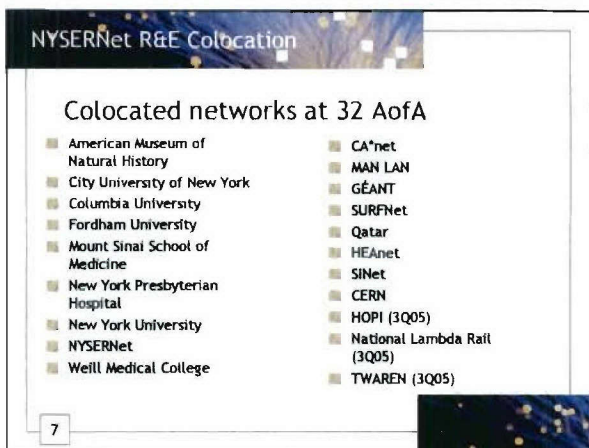


Colocation
Site — 32 Avenue
of the Americas

6

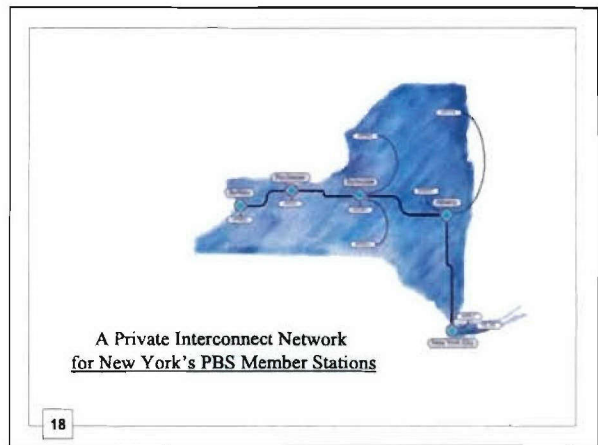
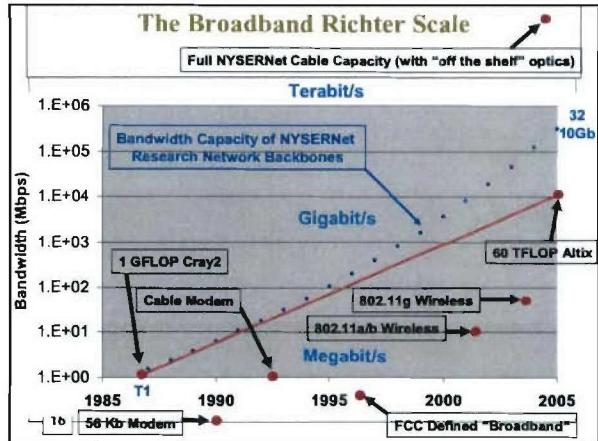
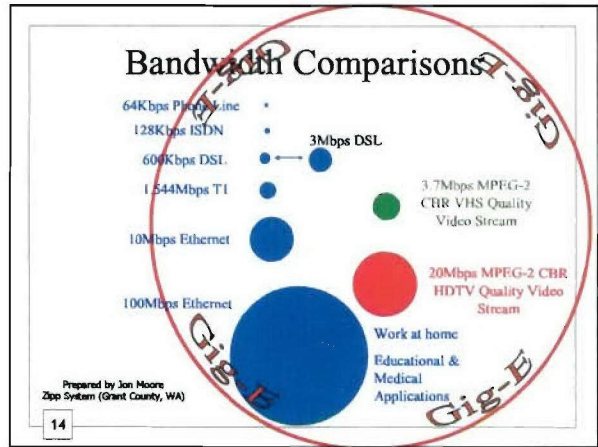
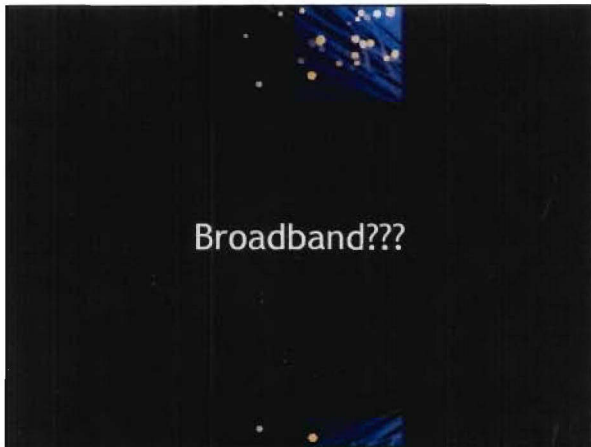
Big Pipes, Emptying Pipes

Tim Lance, NYSERNet



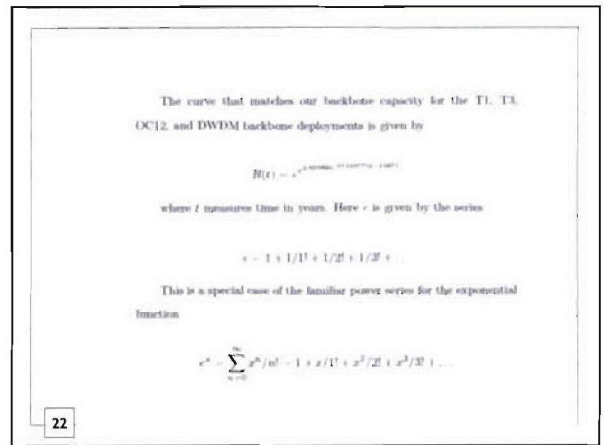
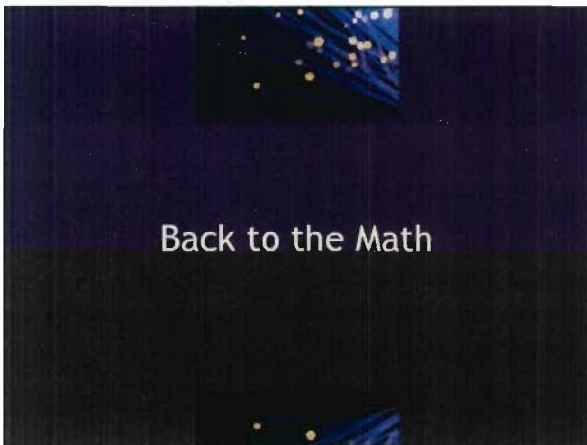
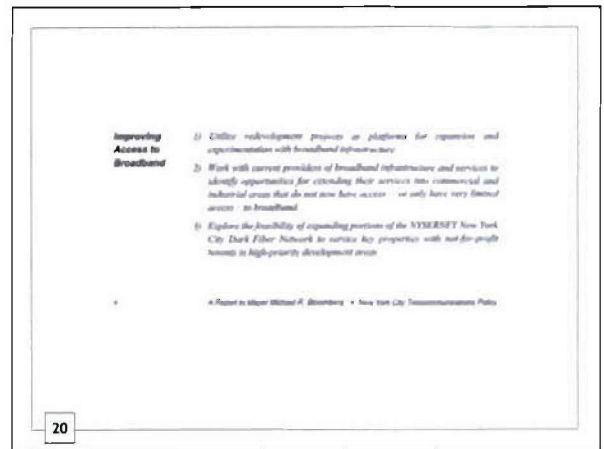
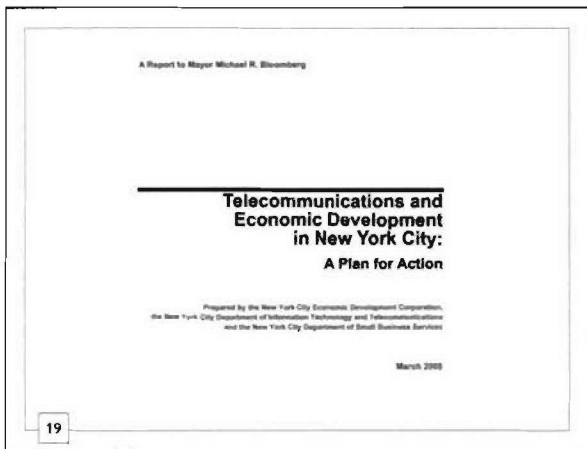
Big Pipes, Emptying Pipes

Tim Lance, NYSErNet



Big Pipes, Emptying Pipes

Tim Lance, NYSERNet



Broadband Content: Arts and Technology

Mike Moore, Virginia Tech

Broadband Content: Arts and Technology

Dr. Carole Inge
Virginia Tech
NASA VT-STEM

Virginia
Tech

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY



Broadband Content

- Applications which utilize high speed networks
 - Videoconferencing
 - HD Video delivery
 - Virtual Environments
 - Dynamic Data Layers
 - Stereographic signals

ARTS

- Painting
- Animation
- Sculpting
- Writing
- Videography

TECHNOLOGY

- Programming
- Engineering
- Drafting
- Sciences
- Data Management

Arts and Technology: Evolution

- Traditional Arts Programs are evolving due to emerging digital media

Arts and Technology: Visualization

- Advanced Visualization is changing the way scientists analyze data in fields such as Biotechnology, Engineering, and Computer Science

A ARTS TECHNOLOGY OGY

- Paint • Three Dimensional Design
- Anim • Digital Video Production
- Sculp • Web Design
- Writi • Data Visualization
- Vide • Flash Animation

ent

Broadband Content: Arts and Technology

Mike Moore, Virginia Tech

Arts Technology Influences

- Geospatial Technology and Engineering Industries
- Marketing and E-Commerce
- Electronic Entertainment

Geospatial and Engineering

- Computational Science allows the analysis of exponentially increasing levels of data

Marketing and E-Commerce

- Advertising is evolving to utilize the capabilities of the 3D Internet

Electronic Entertainment

- EE applications represent some of the most realistic and lucrative virtual environments in existence

Electronic Entertainment

- Electronic Arts is the fifth largest publicly owned software company in the US
- Yearly revenues : \$3 Billion
- Larger than Apple and Pixar combined

Electronic Entertainment

- Expectations are high as movies and game markets continue to merge

Broadband Content: Arts and Technology

Mike Moore, Virginia Tech

Educational Impact?

- How will access to broadband content influence educational communities in years to come?

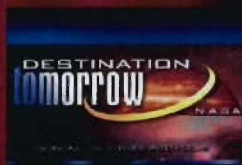
Educational Impact: Distribution

- Broadband creates a new outlet to reach K-20 populations
 - Synchronous
 - Videoconferencing
 - Asynchronous
 - Streaming video
 - Real-time Interactivity
 - Dynamic Data Layers



NASA Center for Distance Learning

- Based out of NASA VT-STEM program at Virginia Tech, NASA CDL produces five television and multimedia programs
 - [NASA Live](#)
 - [KSNN](#)
 - [SCIFiles](#)
 - [Connect](#)
 - [Destination Tomorrow](#)



Riverstone Technology Park

- NASA VT-STEM will be located within Riverstone Technology Park Building One



Educational Impact: Commercial

- Commercial
 - Proliferation of Broadband networks create the opportunity for a new market for educational content

Educational Impact: Evaluation

- Evaluation
 - Broadband access creates both new challenges and new opportunities for evaluation of educational content



Broadband Content: Arts and Technology

Mike Moore, Virginia Tech

Educational Impact

It is thrifty to prepare today for the wants of tomorrow.

Aesop (620 BC - 560 BC), The Ant and the Grasshopper

**Research and development in
Broadband Educational Content is vital
to maximizing the potential of next
generation networks**

The First Mile in Healthcare



Michael J. Ackerman, Ph.D.
Assistant Director

High Performance Computing and Communications
National Library of Medicine



UNITED STATES
National Library of Medicine



PubMed

National Library of Medicine

ClinicalTrials.gov

MEDLINEplus
Health Information

National Library of Medicine

National Library of Medicine
Specialized Information Services

SIS

www.nlm.nih.gov

NGI Agencies - 1996



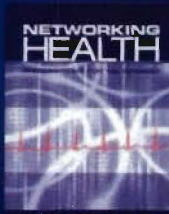
- DARPA - Defense Advanced Research Projects Agency
- NSF - National Science Foundation
- DoE - Department of Energy
- NASA - National Aeronautics and Space Administration
- NIST - National Institute of Standards and Technology
- NLM - National Library of Medicine

NGI and UCAID Goals



- Goal 1: Research:
 - Promote experimentation with the next generation of network technologies
- Goal 2: Network Testbeds:
 - Develop a next generation network testbed to connect universities and federal research institutions at rates that are sufficient to demonstrate new technologies and support future research
- Goal 3: Applications:
 - Demonstrate new applications that meet important national goals and missions

Networking Health: Prescriptions for the Internet



A study by the:

U.S. National Research Council
Computer Science Technology Board

<http://www.nap.edu/catalog/9750.html>



QoS Features for Healthcare

- Bandwidth reservation
- Low latency
- Low jitter
- Variable priority
- Data Integrity
- Selectable loss rate
- Security



Home and Office Network Speeds

	Speed	Text	Image
	(bps)	80x25 (sec.)	1000x750x24 (sec.)
56k Modem	56,000	0.3571	40.179
ISDN	128,000	0.1562	17.578
DSL - incoming	500,000	0.0400	4.500
DSL - outgoing	128,000	0.1562	17.578
Cable - incoming	750,000	0.0267	3.000
Cable - outgoing	128,000	0.1562	17.578
Wi-Fi - 802.11b	11,000,000	0.0018	0.205
Ethernet	100,000,000	0.0002	0.023



Need for NGN in Radiology

- Digital radiology of the chest 200 mbits 2 sec.
- Mammography 1,600 mbits 16 sec.
- MRI study 2,000 mbits 20 sec.
- Echo-cardiogram study 40,000 mbits 400 sec. (6min. 40 sec.)

100 base-T Ethernet



Real-time Telemedicine: sponsored by The National Institutes of Health

Categories

Medicine, Collaboration

Vision

Provide a means of remote medical consultations through the use of real-time analysis of medical diagnostic procedures involving motion.



Why NGI?

For accurate medical diagnosis, real-time telemedicine would require 75 Mbits/sec transmission speeds for video sequences such as echo-cardiography. In addition, latency must be maintained at a constant rate to prevent errors in diagnosis.

Description

Medical diagnosis is often based on the real-time observation and analysis of objects in motion. These situations tend to be in the realm of different medical specialists which are not conveniently available in many communities. Telemedicine consultations would be very useful and practical in these circumstances. Such situations might include orthopaedic gait analysis, monitoring nystagmus (vibrations of the eye) during a neurological examination, viewing the echo-cardiogram during a cardiology examination or looking through the endoscope during an endoscopy procedure.



Baby CareLink



Beth Israel Deaconess Medical Center,
Boston, MA



Video house calls for patients with special needs



National Laboratory for the Study
of Rural Telemedicine,
University of Iowa, Iowa City, IA



Radiation Oncology Treatment Planning/Care Delivery Application

- Develop, implement, and evaluate NGI capabilities for radiation oncology treatment planning and care delivery.
- Application will provide diagnostic support, treatment planning, and remote verification of equipment from Cancer Center to a remote treatment facility.
- Focus on quality of service, security, privacy, and data integrity.

Johns Hopkins University Applied Physics Laboratory, Laurel, MD
Peninsula Regional Medical Center, Salisbury, MD



JOHNS HOPKINS
UNIVERSITY

Remote, Real-time Simulation for Teaching Human Anatomy and Surgery

- Demonstrate remote, real-time teaching of human anatomy and surgery
- Deliver real-time simulation and visualization technologies
- Network-based architecture will allow for multiple high-resolution stereo-graphic displays and haptic devices



Stanford University
School of Medicine
Stanford, CA



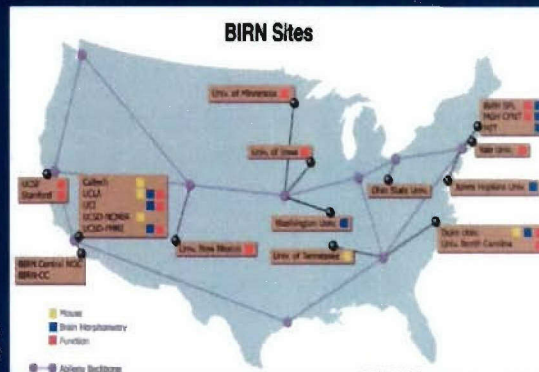
What is the BIRN?



The BIOMEDICAL INFORMATICS RESEARCH NETWORK

IT Infrastructure to hasten the derivation of new understanding and treatment of disease through use of distributed knowledge

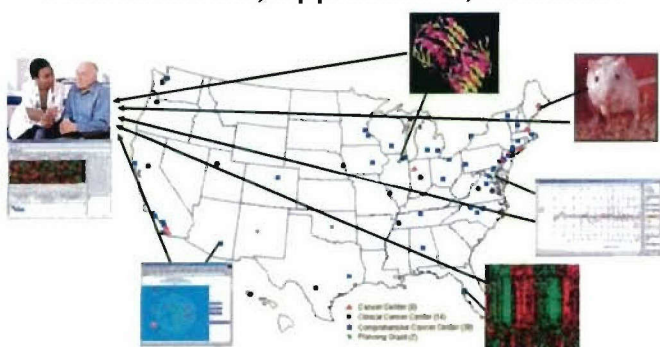
- A stable, robust, shared network and distributed database environment across **>20 institutions**, tailored to the BIRN collaborations.
- **Extensible tools** and IT infrastructure that can be reused.
- Established **Cyber-infrastructure** for a virtual data grid
- Involves a large scale data integration effort



**It will no longer matter where data, instruments and computational resources are located!*



caBIG will facilitate sharing of infrastructure, applications, and data



National Library of Medicine

www.nlm.nih.gov



Research, Development and Rapid Prototyping TATRC



U.S. ARMY MEDICAL RESEARCH & MATERIEL COMMAND
BG Eric B. Schoomaker, Commanding

Deputy for Advanced Technologies
Colonel Jeffrey Roller, M.D., USAF
Director, Telemedicine & Advanced
Technology Research Center (TATRC)

**Research, Development &
Rapid Prototyping**

TATRC



Telemedicine & Advanced Technology Research Center
Leading Edge Medical Technology

U.S. ARMY MEDICAL RESEARCH & MATERIEL COMMAND

Rapid Prototyping & Delivery Strategies

"Give Them....What They Want!"

26 October 2005



Briefing Sequence

- ☐ Mission, Funding - Programs
- ☐ ICMEDO "Triple Helix Rapid Prototyping"
- ☐ Army's Greatest Inventions: "Chain of Custody" Analysis
- ☐ Military Health System CIO: Joint Medical Information System R&D Program Office
- ☐ Triple Helix Congressionals: CIMIT, CoMBR, HUI, TS, etc
- ☐ AAMTL AMEDD Advanced Medical Technology Insertion Program
- ☐ MARP: Military Amputee Research Program
- ☐ Medical Logistics: Joint Medical Logistics R&D Program Office
- ☐ Deployments: Stryker, FDDMTF, 44th Med CMD



Mission:

Funding - Programs

Telemedicine & Advanced Technology Research Center
Leading Edge Medical Technology

**Telemedicine and Advanced
Medical Technology Program**

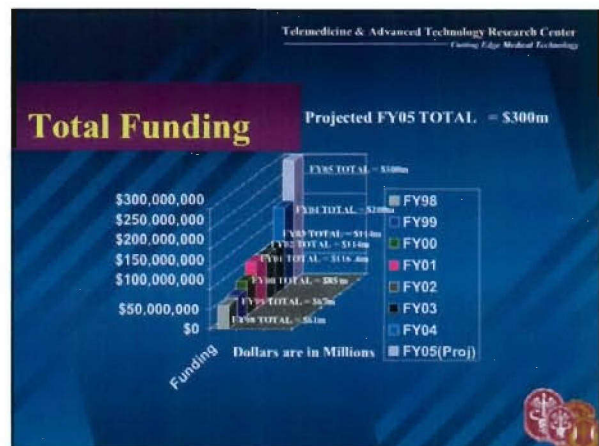
Mission

Apply physiological and medical knowledge, advanced diagnostics, simulations, and effector systems integrated with information and telecommunications for the purpose of enhancing operational and medical decision-making, improving medical training, and delivering medical treatment across all barriers.

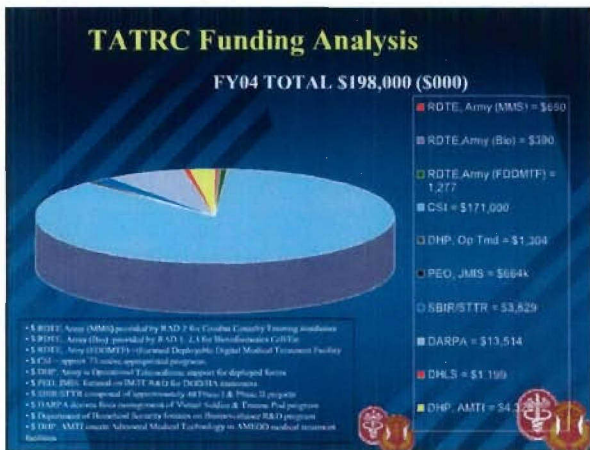
The program scope is to identify, explore, and demonstrate key technologies and biomedical principles required to overcome technology barriers that are both medically and militarily unique.

Department of Defense,
Joint Warfighting Systems and
Technology Plan, Chapter IX, Joint
Readiness and Logistics, 1999





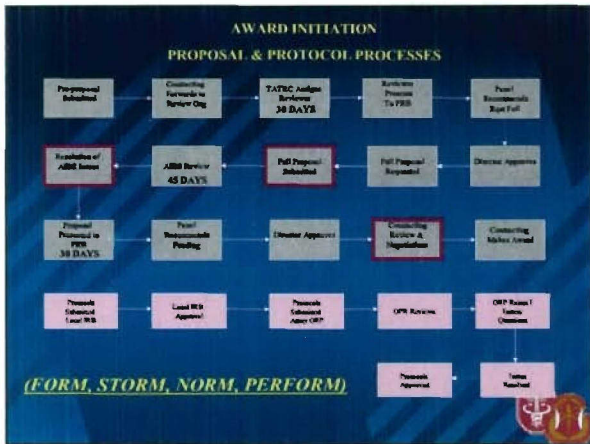
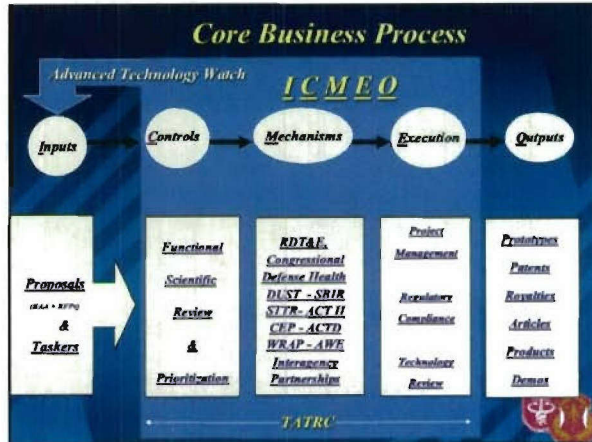
Research, Development and Rapid Prototyping



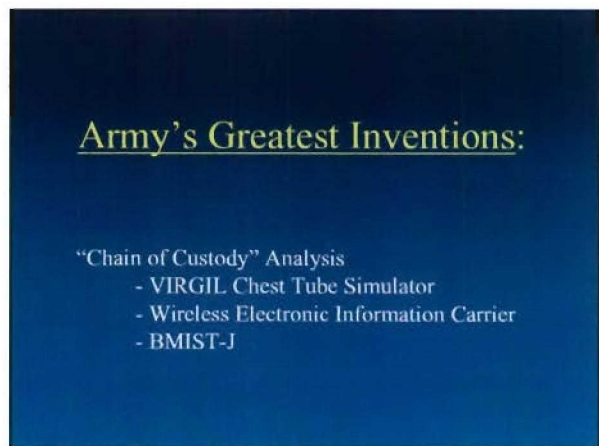
ICMEO:

Triple Helix

Rapid Prototyping - Partnerships



Research, Development and Rapid Prototyping TATRC



Research, Development and Rapid Prototyping TATRC

MULTIPLE TECHNOLOGIES TO MEET MULTIPLE TRAINING NEEDS

(Medical Modeling & Simulation Product Portfolio - Dr. Gerry Moses)

PC-based Interactive VR/Multimedia

Digitally Enhanced Mannequins

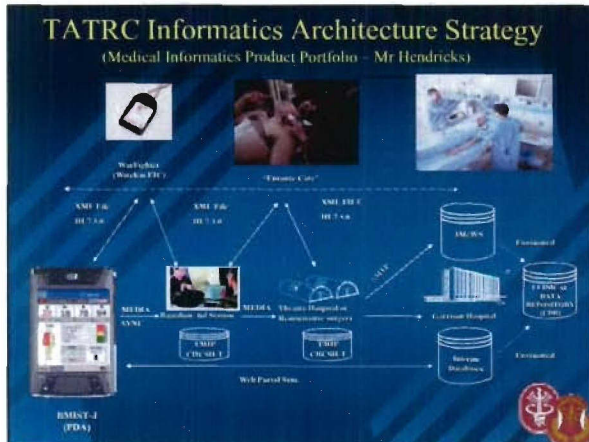
Virtual Workbenches

Total Immersion Virtual Reality

VIRGIL - CIMIT

(★ Army Best Invention 2003)
Chest Tube Insertion Simulator

- Funded by CIMIT CSI program
- Developed in collaboration with SF Medicals
- Validated at USUHS & Boston College
- VIRGIL simulator is being reduced in size to make it "field deployable" and easy to carry into a training situation.
- System is being "ruggedized" to assure reliable performance in real-use situations.
- System is available for field testing and adoption into the DoD training process, including:
 - Simulator
 - Training modules
 - Curriculum



Wireless Electronic Information Carrier "Electronic Dog Tag"

Complete electronic health record

Electronic dog tag

Wireless electronic dog tag

Army's Best Invention 2004

Battlefield Medical Information System Tactical (BMIST-J)

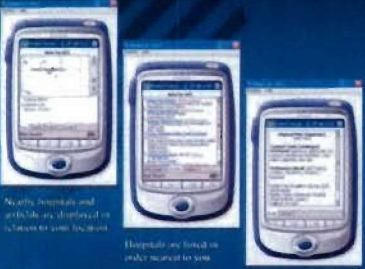
- Funded by NMTC CSI Program
- Developed in collaboration:
 - SOCOM
 - Stryker Brigade
- Suite of mobile applications
- Empower providers via:
 - access to information,
 - decision support tools,
 - electronic health record.
- Synchronizes with Joint health surveillance and medical information systems

Modular, Scalable...Horizontal Proliferation Veterinary Application

BMIST-V holds Military Working Dogs' (MWD) complete medical records, including immunization status. During deployment, data is stored locally. Additionally, this data can be remotely transmitted and stored by other Department of Defense Systems.

Research, Development and Rapid Prototyping TATRC

Pocket TRAVAX (White House CRADA)



- Pocket Travax is a handheld tool that allows users to locate hospitals or clinic that can provide needed emergency services by country location or GPS coordinates
- Providing travelers information for medical emergencies
- Eventually provide dynamic/real-time local capabilities data

Neighboring hospitals and clinics are displayed on a screen to assist the user

Hospitals are listed in order nearest to user

Hospital descriptions, contact information & GPS location

CRADA: Cooperative Research and Development Agreement

Wireless Sensors (Commercial Partnership)

- Multiple patient monitoring
- Multimedia electronic health record



WelchAllyn CRADA: Cooperative Research and Development Agreement

Innovative "Architecture"

Blood information program (BIP)

- The Blood Information Program (BIP) is a suite of mobile applications to manage blood inventories. Includes:
 - Blood Inventory Program
 - Blood report generator
 - Transfusion/Disposition Module



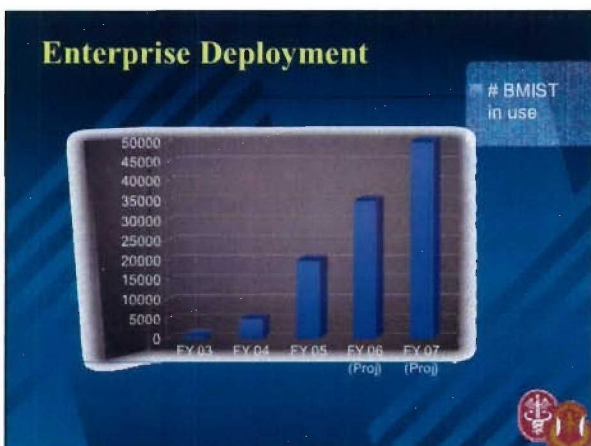
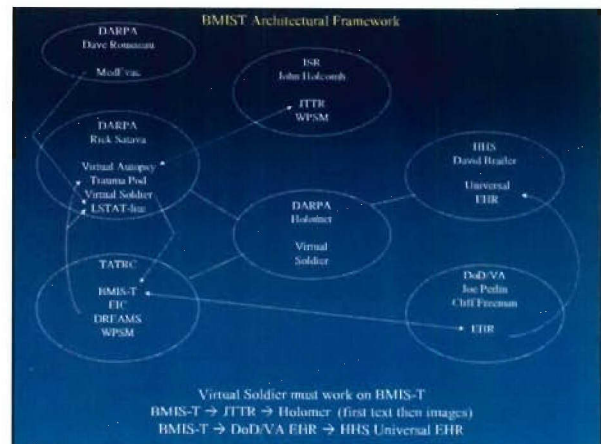
Plug - n - Play, Reuse of Code

The Army's Greatest Invention 2004

United U.S. Medicine Frank Brown Barry Price

RAVE

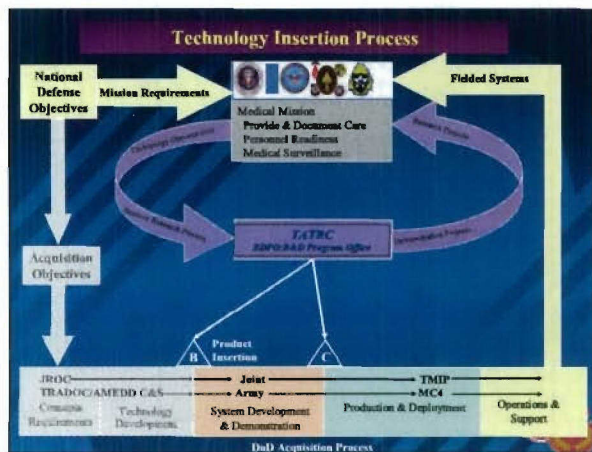
Nomadic World Award



Military Health System Chief Information Officer:

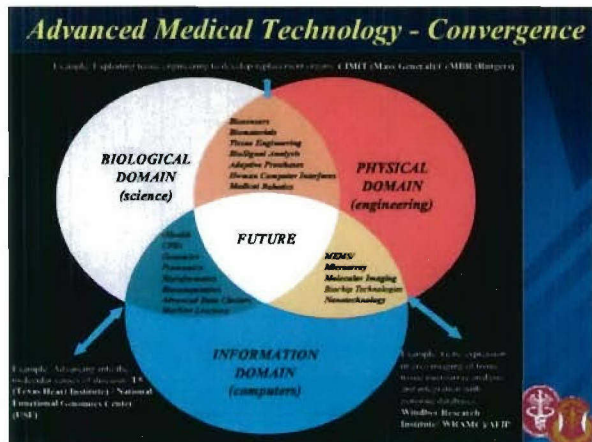
Joint Medical Information System
R&D Program Office

Research, Development and Rapid Prototyping TATRC



Triple Helix Congressionals:

CIMIT, CeMBR, HUI, T5, etc



DARPA-TATRC Virtual Soldier Concept

Build a Virtual Soldier on an Electronic "Dog Tag" to Diagnose and Predict Combat Injury

WHY?
Quickly & Accurately diagnose internal combat injury (Heart)

HOW?
3-D model from total body scan on "Dog Tag" (Anatomy & Physiology)
Compare to data acquired on the battlefield after wounding (Vital Signs, Ultrasound & CT)

Holographic Medical Electronic Representation "Holomer"

Predict likelihood of battlefield mortality

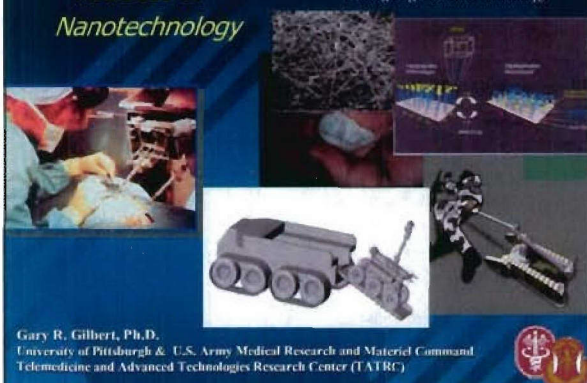
Accurate Diagnosis & Treatment Saves Lives

FOR THE INDIVIDUAL SOLDIER THIS MEANS:
Empowering the individual medic at the point of wounding to make a timely diagnosis of an injury with the same expertise as having an expert surgeon on site.

DARPA Program Manager: Dr (Col-Ret) Richard Satava

Robotics & Nanotechnology

U.S. Army Medical Research and Materiel Command
Telemedicine & Advanced Technology Research Center
Cutting Edge Medical Technology



AMEDD Advanced Medical Technology Initiative (AAMTI):

Inspiring & Enabling Medical Innovation in the Direct Care Setting

Research, Development and Rapid Prototyping TATRC

AAMTI Program

- Army Surgeon Funded
- Medical Technology Entrepreneurship
 - Reduce Cost, Increase Access, Improve Quality
- Successes:
 - AERO (Paperless Physical Exam)
 - Telepathology
 - Kiosks
 - Teleneural Health
- Strategy
 - Competitively Fund “Best of Breed”
 - Demonstrate/Validate CSI, SBIR in AMEDD Setting
 - Inspire/Enable Development of New Generation of AMEDD Leaders



MARP: Military Amputee Research Program

Medical Logistics

MARP

- Military Amputee Research Program (MARP) was formed at the Walter Reed Army Medical Center (WRAMC).
- FY01 CSM Sponsor: Rep. Bill Young, R-FL
 - FY01: \$1.1 M
 - FY02: \$1.1 M
 - FY03: \$1.1 M (est.)
- TATRC provides programmatic support and funding management for the MARP.
- TATRC and the MARP have identified five areas of prosthetic/amputee-related research focus:
 - Prosthetic Technology Advancement
 - Amputations and Rehabilitation Strategies
 - Advancements in Clinical Management
 - Epidemiological Studies
 - Database Development and Management
- To ensure best research MARP accepts intramural research proposals from WRAMC DoD researchers, as well as extramural proposals.
- Received 22 extramural pre-proposals
 - 13MM as total submissions to date.
 - 11MM as submissions currently being considered for funding.
- TATRC is also pursuing amputee-related research through the STTR and SBIR programs.
 - Phase I STTR proposals have recently been awarded to address the Military Specific Prosthetic Design and Performance needs.
 - Phase I SBIR topic addressing the needs for a Military Specific Prosthetic Shoulder System is now accepting proposal submissions.
- TATRC has established a relationship with COL. Geoff Long, MD, PhD, at DARPA.
 - Leverages research being performed through DARPA's 2 year and 4 year Advanced Prosthetic R&D projects.



DEPLOYMENTS

Forward Deployable Digital Medical Treatment Facility (FDDMTF)



- Patriot 05: 7-22 July: Air Force medical exercise, Volk Field, Wisconsin
- Exercise Raven Wedge, 6-18 August, Camp Peleard, Maryland
- Airport, Academia, Industry, Military and State Exercise (AAIMIS) 23 Oct - 7 Nov, Baltimore, Maryland Martin State Airport

- Item: Forward deployable hospital interim to FMMS
- Capability: 0-44 bed, C130 rapidly deployable, digitized systems, leverages emerging lighter GOT/COTS technologies
- Wgt., cube, & Pwr: < U3 DEPMEDS, FDECU
- User(s): FST & CSH Critical Care Holding for Unit of Action
- Estimated Schedule:
 - FDDMF Prototype FY02
 - FMSS Prototype FY04
 - Available for fielding: FY08
- FDA approval:
- Funding: Congressional
- SORC Supported: Sustainability, F&E, Deployability, B(1.7).



TF 325 Med
(Bagram)

Radiology
Dermatology
Neurosurgery

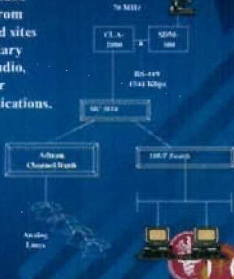


Research, Development and Rapid Prototyping TATRC

Brigade Remote Subscriber System (BRSS)



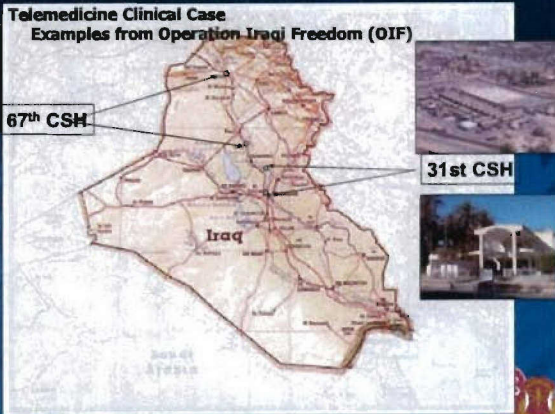
Description:
The BRSS is capable of receiving and transmitting voice, data and video simultaneously from multiple deployed sites using either military or commercial radio, wired, wireless or satellite communications.



Capabilities:

- 24 Local telephones
- Internal calling
- External world-wide dialing
- Internet Access
- Video Conferencing
- Secure Communications

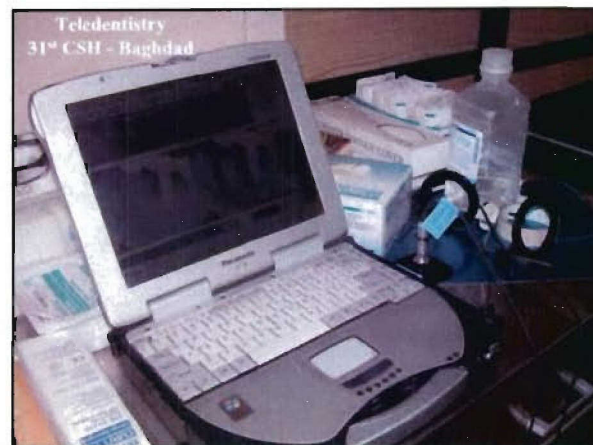
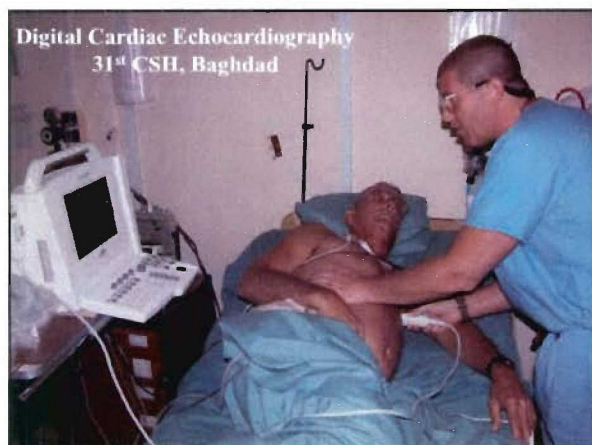
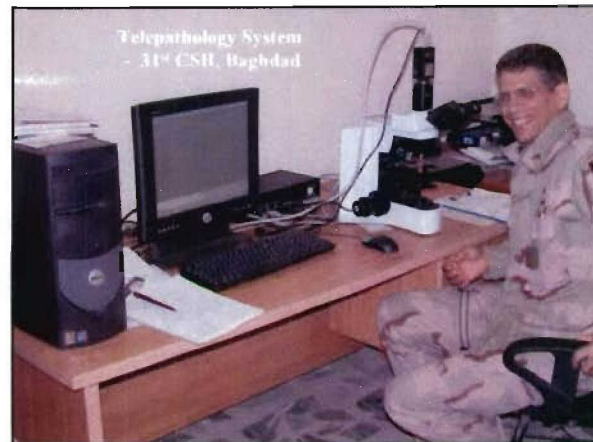
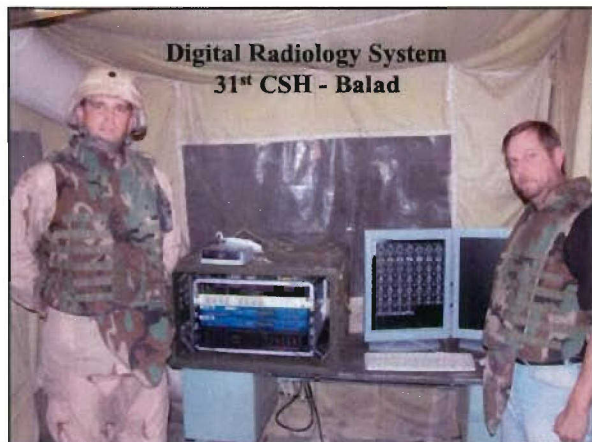
Telemedicine Clinical Case Examples from Operation Iraqi Freedom (OIF)



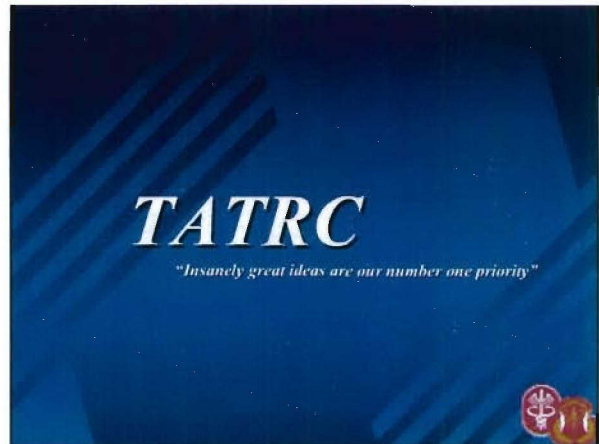
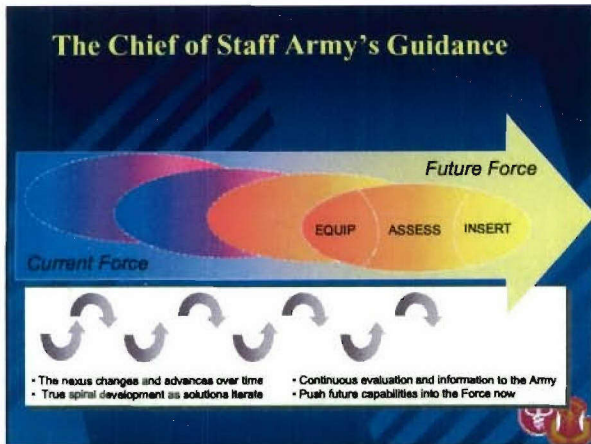
67th CSH

31st CSH

Iraq



Research, Development and Rapid Prototyping TATRC



Medical Informatics, Telemedicine, and Advanced Technology Research

Gary Gilbert, TATRC

Telemedicine & Advanced Technology Research Center
Enabling Future Medical Technology

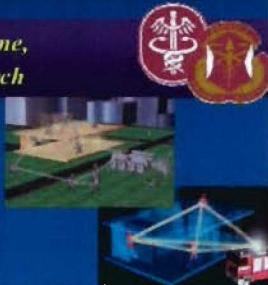
U.S. ARMY MEDICAL RESEARCH & MATERIEL COMMAND
BG Eric B. Schoomaker, Commanding

**Medical Informatics, Telemedicine,
& Advanced Technology Research**

"FirstMile
Big Broadband Everywhere Conference"
September 14, 2005

Colonel (Dr) Jeffrey Roller, MC, USAF
Director, Telemedicine & Advanced Technology Research Center (TATRC)

Gary R. Gilbert, PhD,
University of Pittsburgh Interpersonal Personnel Act (IPA)



Telemedicine & Advanced Technology Research Center
Enabling Future Medical Technology

**Telemedicine and Advanced
Medical Technology Program**

Mission
Apply ... medical knowledge ... information and telecommunications for ... enhancing operational and medical decision-making, improving medical training, and delivering medical treatment across all barriers.

Program scope ... identify, explore, and demonstrate key technologies ...

Department of Defense,
Joint Warfighting Science and
Technology Plan, Chapter IX, Joint
Readiness and Logistics, 1999



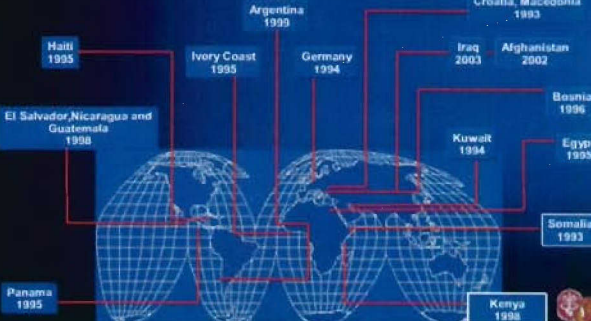
Medical Telepresence ...
... Projecting Specialty Care
Support in Far-Forward,
Difficult-to-Serve Areas.



U.S. Army Telemedicine
Early years (1992-97)



Deployed Telemedicine since 1992...



Special Medical Augmentation Response Team
Medical Command Control & Communications Telemedicine

**SMART
MC³T**



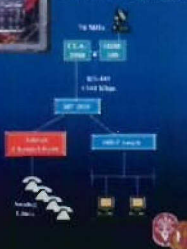

Supports special medical augmentation teams Trauma/Critical Care
Chemical/Biological, Stress Management, Preventive
Medicine/Disease Surveillance, Burn, Veterinary, and Health Systems
Assessment Assistance

**Warfighter Information Network Proof of Concept (WIN-POC)
& Brigade Remote Subscriber System (BRSS)**




Capabilities:
24 Local telephones
Internet Access
Video Conferencing
Secure Communications

Capabilities:
50 Local telephones
6 International telephones
(voice over IP)
18 Local area pagers
18 Wireless handsets
48 Analog handsets
12 Digital handsets
Internet & email for 300 users
Video Conferencing
Secure Communications



Medical Informatics, Telemedicine, and Advanced Technology Research Gary Gilbert, TATRC

Real-world telemedicine technology deployments

Computed Radiology

Operation Iraqi Freedom

Operation Enduring Freedom

Teleradiology

MEDWEB RAQ-4

Digital Communications Brigade Remote Subscriber System

Direct Digital X-ray

Medical Informatics: BMIST, PIC, FDR

Web-based Logistics INTERIM... Solutions

- Compression-based and stop-gap COMMUNICATIONS SOLUTIONS BRIDGE THE GAP but are still inadequate in response time, quality and security
- TACTICAL solution
 - ◆ CONNECT SATCOM to WIRELESS LAN FOR THE "FIRST MILE"
- INSTALLATION Solution:
 - ◆ USE Fibre and WIRELESS LANs FOR THE "FIRST MILE"

Cytology

14,208 bytes

10,866,838 bytes

Blood Cells

15,087 bytes

15,328,840 bytes

Xrays

6,883 bytes

18,661,356 bytes

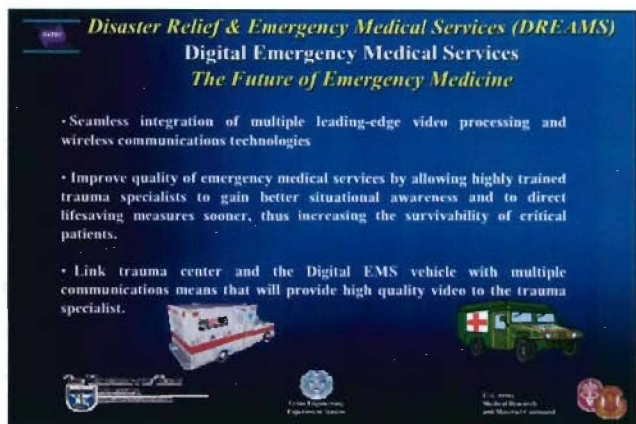
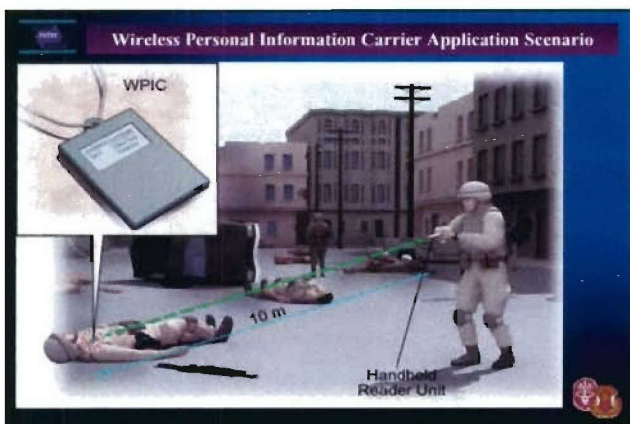
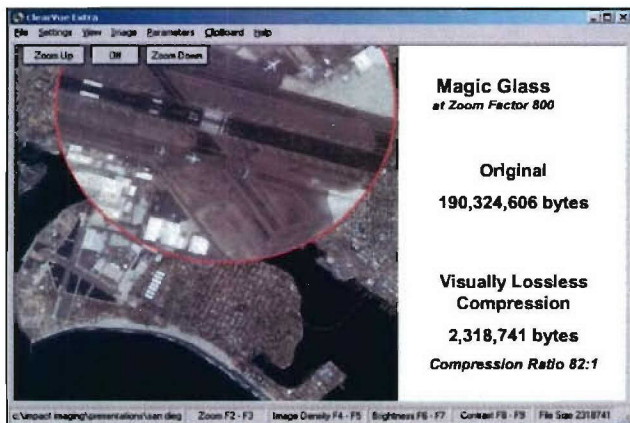
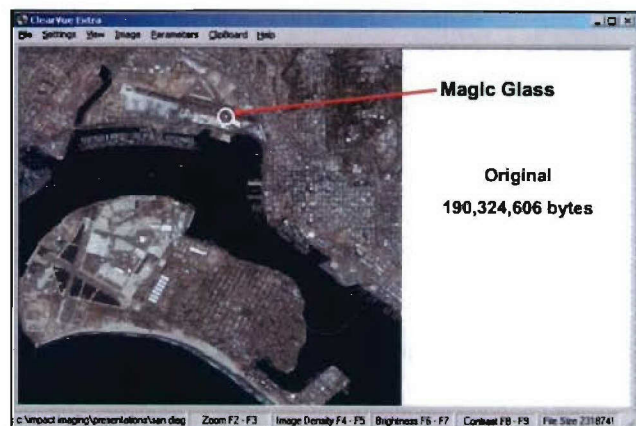
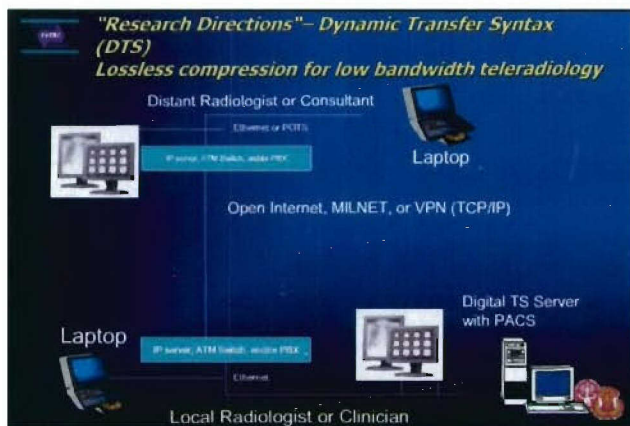
Cervical Spine Xray

7,119 bytes

20,597,652 bytes

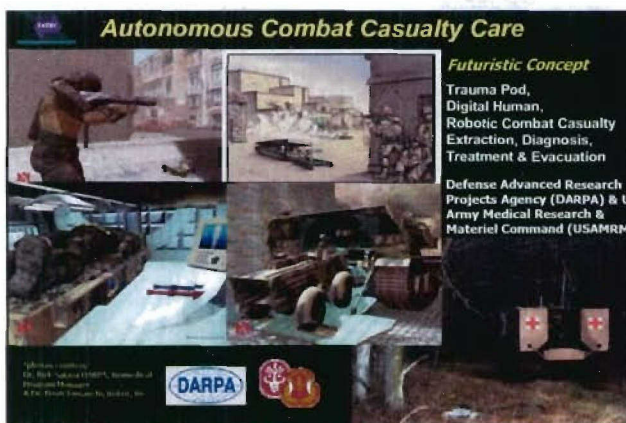
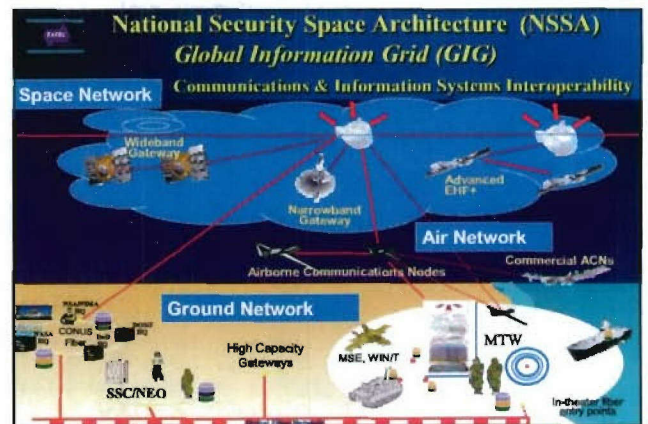
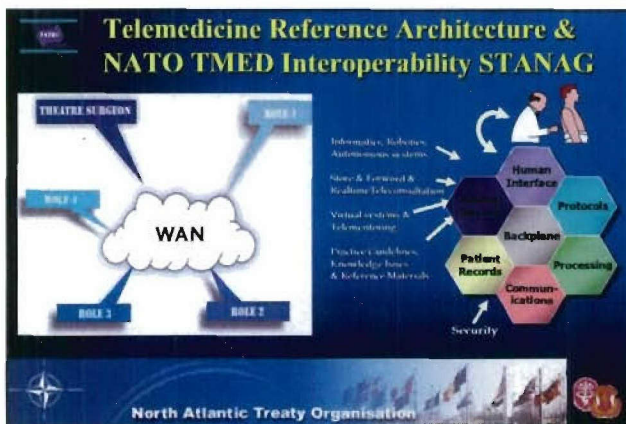
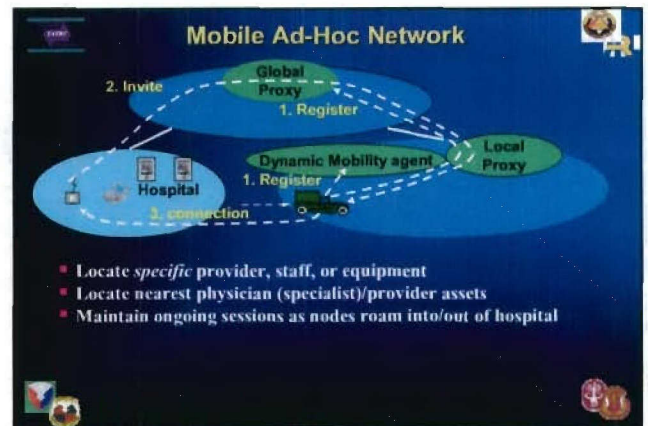
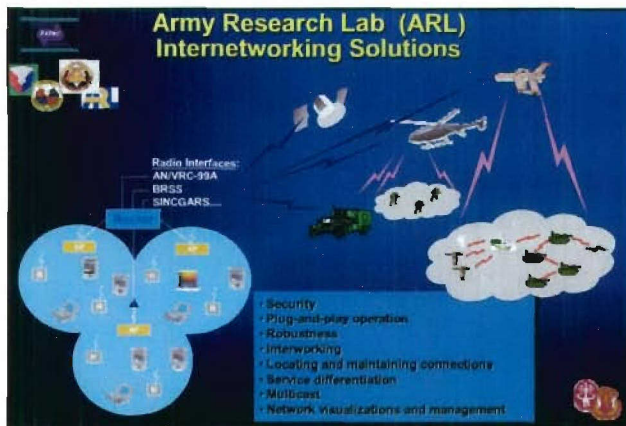
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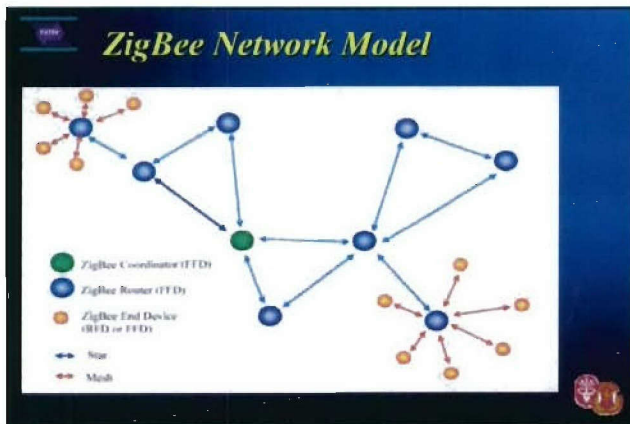
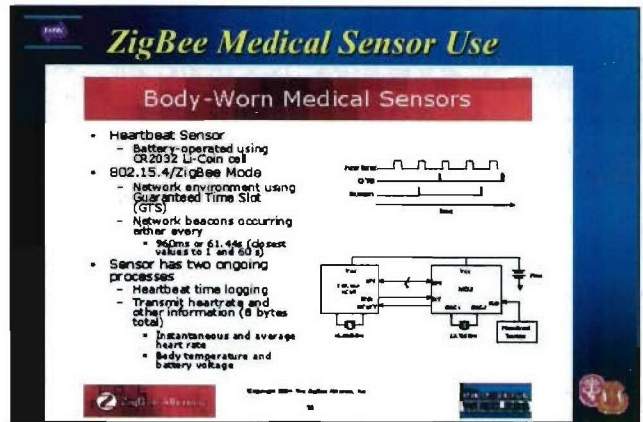
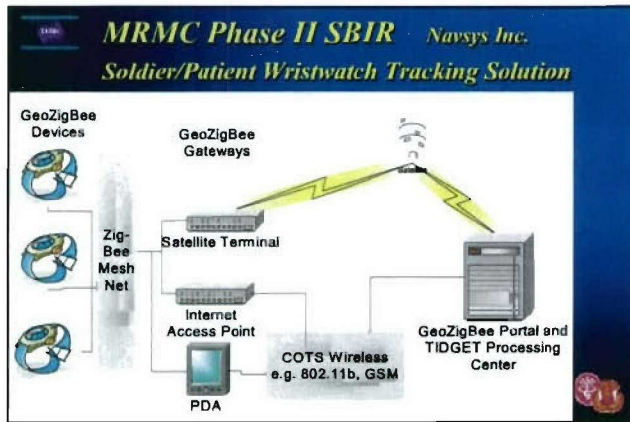
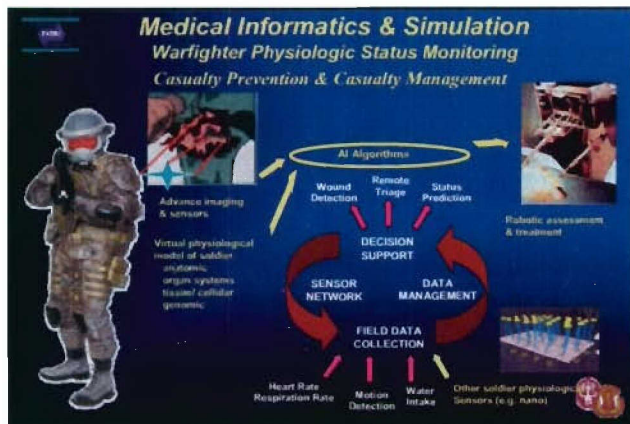


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Comparison of COTS Wireless Network Technologies

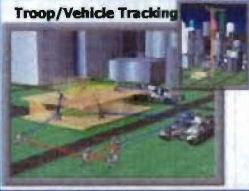
	ZigBee™ 802.15.4	Bluetooth™ 802.15.1	Wi-Fi™ 802.11b	GPRS/GSM 1XRTT/CDMA
Application Focus	Monitoring & Control	Cable Replacement	Web, Video, Email	WAN, Voice/Data
System Resource	4KB-32KB	250KB+	1MB+	16MB+
Battery Life(days)	100-1000+	1-7	.1-5	1-7
Nodes Per Network	255/65K+	7	30	1,000
Bandwidth(kbps)	20-250	720	11,000+	64-128
Range(meters)	1-100+	1-10+	1-100	1,000+
Key Attributes	Reliable, Low Power, Cost Effective	Cost, Convenience	Speed, Flexibility	Reach, Quality

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Army Research Lab SBIR – Phase II
Innovative Wireless Technology Inc.

- **Contract**
 - ◆ Develop innovative algorithms for geo-location using Ultra Wide Band (UWB)
 - ◆ Define a suitable architecture for real-time implementation of the UWB geolocation system
- **Multi-band**
Orthogonal Frequency Division Multiplexing (OFDM) (UWB)
 - ◆ Investigate UWB Multi-band OFDM design approach
 - ◆ Transition to UWB Multi-band OFDM

Troop/Vehicle Tracking


1st Responder Tracking


ARL - USARMC/TATRC Phase II+ Contract
Integrated Wireless Technology Inc.

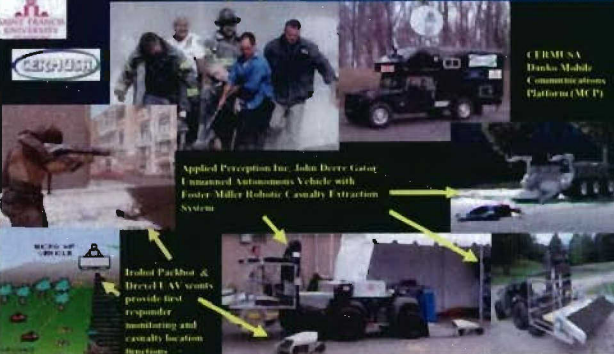
Soldier/First Responder/Casualty/Unmanned Vehicle Tracking


SBIR Phase II+ Contract


- Implement Secure UWB Communications Link with Forward Deployable Digital Medical Treatment Facility (FDDMTF)
- Integrate UWB wireless communication node with prototype robotic patient rescue system developed by Applied Perception
 - ◆ Marsupial robotic vehicle pair incorporating teleoperation, semi-autonomous and autonomous control capabilities
 - ◆ Supports ad-hoc, mesh networking with indoor and outdoor geo-location capability

UWB Transceiver


Saint Francis University
Center of Excellence for Remote and Medically Underserved Areas
Robotic Emergency Medicine and Danger-Detection (REMed-D)

Applied Perception Inc. John Deere Gator Unmanned Autonomous Vehicle with Foster Miller Robotic Casualty Extraction System


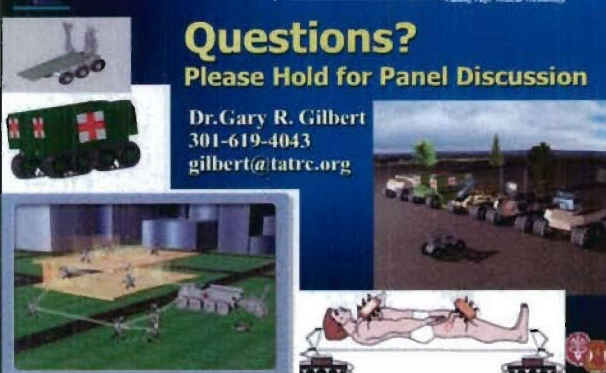
GERMUSA
Drone, Mobile, Customizable, Platform (MC P)

Robot Packbot & Brevel UAV teams provide first responder monitoring and casualty location functions

Telemedicine & Advanced Technology Research Center
Faculty, Adj. Res. & Technology

Questions?
Please Hold for Panel Discussion

Dr. Gary R. Gilbert
301-619-4043
gilbert@tatrc.org



A Few of My Favorite Gadgets

Susan Estrada, FirstMile.US

A Few of My Favorite Gadgets

Susan Estrada, President

susan@firstmile.us



Why devices?

- New devices will make broadband
 - More compelling for many
 - Finally useful for others
 - Affordable for countless
 - Easy for the keyboard-challenged
 - And the list goes on....



That's Entertainment



E-medicine - seniors health and well-being at home

- As the 77 million baby boomers age, there simply won't be enough medical professionals, money or health services to provide personal care for every condition. Imagine...
 - A wristwatch that can help find a wandering Alzheimer's patient
 - Smart Band-Aids that check your temperature and heartbeat
 - Sensors in bedsheets that monitor sleep apnea and snoring
 - RFID tags in pajamas



Live and Let Live

- "A patient in Houston can be whisked to a Level 1 trauma center inside 15 minutes; in Southwest Texas's Webb County, the trip might take two hours. This so frustrated Texas trauma surgeon James H. "Red" Duke that he developed a digital ambulance that lets doctors orchestrate treatment from the hospital. The Disaster Relief and Emergency Medical Services Interact ambulance transmits and receives vitals and video by switching among cellular, satellite and 802.11 networks. Vibrations, corners and overpasses cause most antennas to drop their connection, but this one keeps a tight lock even on twisty roads. Should a connection failure occur, error-correcting software in a pair of \$73,000 modems reconstructs the missing bits. The system transmits patient information to the hospital, where ER docs see and hear everything through videoconferencing equipment and issue instructions to en route EMTs."



A Few of My Favorite Gadgets

Susan Estrada, FirstMile.US

The Conclusion

- Our future will be filled with easy-to-use, specialized contraptions that will drive big broadband everywhere.



Wi-Fi Arrives

- Everyone becomes a Broadcaster!



Mesh Networking

- Alternative to 'star' architectures (Point to Multipoint)
- Example of peer to peer architecture
- Ad-hoc networking
- More advanced use in Europe due to different regulatory framework

Meshcube

meshcube available now!

Welcome to the OpenSource distribution of the meshcube!

Due to the lively interest and the many requests for the meshcube we have decided to allow ordering as soon as possible. For this reason you can now order the meshcube here until we will have launched our webshop at meshcube.com.

Especially for communities we offer the meshcube as a kit which can easily be assembled. Prices start at 199,90 EUR. The kit comes without antennas to allow highest flexibility to the lowest possible price.

For those who want to start meshing right away this true linux-device can also be ordered readily assembled - prices starting at 239,90 EUR.

All prices for the assembled device, for the kit and supplies can be found in the pricelist. To order, simply fill out the PDF-form and send it back (as fax or email) to 4G Systeme GmbH.



Gadgets, Gizmos and The Next Big Thing

Dewayne Hendricks
Dandin Group

Opening Questions

- How many of you:
 - Own an HDTV?
 - Use Skype?
 - Are active bloggers?
 - Using an MP3 Player for Podcasting?
 - Own an Xbox or Playstation 2?
 - Heard the term 'Darknet'?

New Devices - New Rules

- The Tools Make the Rules
- 'Code is Law' Larry Lessig
- The rise of End-to-End or Peer to Peer
- Smart Radios
- Cognitive Radios

The Internet

- Ten years now since the start of the commercial Internet (May, 1995)
- 'Same day service in a nanosecond world'
- The 'pioneers' get the arrows

Sony PSP

- 4.3 in 16:9 480x272 screen
- USB, Memory Stick, Wi-Fi, UMD
- Game Platform; Adjunct to Sony PS3
- Video, Music, Pictures

The Darknet

- Under the radar of most folks
- Consider it to be a collection of private address spaces (no Google here!)
- Accounts for between 60-80% of the total traffic of the global Internet (CacheLogic)
- Becoming more than just a medium to practice piracy

Sony PSP



New Content - New Rules

- Podcasting
- Vidcasting



Daily Source Code

Democracy Now

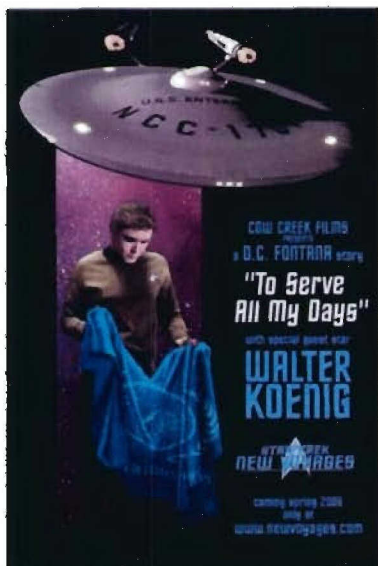
www.democracynow.org

- <http://www.dailysourcecode.com/>

WGBH Morning Stories

Star Trek - New Voyages

- <http://www.wgbh.org/morningstories>



Rocketboom

www.rocketboom.com

Second Life

- <http://secondlife.com/>

Star Trek - Hidden Frontier

- <http://www.hiddenfrontier.org/>

Dr. Who

- <http://www.bbc.co.uk/doctorwho/>

Star Wreck

- <http://www.starwreck.com/>

Star Wars - Revelations

- <http://www.panicstruckpro.com/revelations/>