

ITTC Research Overview

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ITTC Research Mission

- Advance the state-of-the-art in:
 - Intelligent Systems and Information Management
 - Networking and Distributed Systems
 - Lightwave Communications Systems
 - Wireless Communications and Digital Signal Processing (DSP)



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ITTC Research Mission

(Continued)

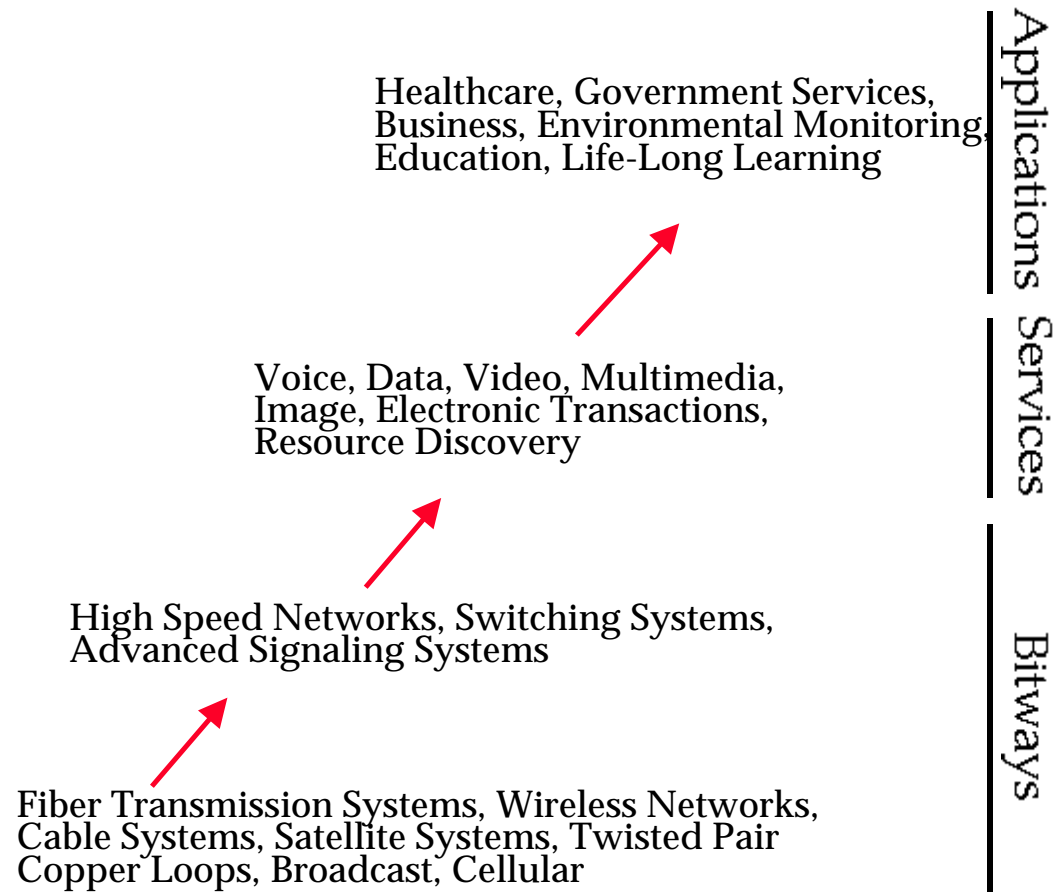
- Develop new:
 - System architectures
 - Component subsystems
 - Algorithms for
 - DSP
 - Network control
 - Network based applications
 - Devices
 - System performance evaluation technologies



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Global Information Infrastructure



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On-going ITTC Research

Applications

UNITE: Using the Internet to Enhance K-12 Education,
KEURP-Link: Web Applications to Support Business Activities,
Data Mining of Blood Incidents Databases

Services

Vision: Digital Video Library, Data Mining,
Information Retrieval,
Data Discovery on the Internet

Bitways

ATM Research, Network Traffic Management and Control,
Rapidly Deployable Radio Network (RDRN),
Large Scale Network for High Speed Distributed Processing and Storage: MAGIC
Voice/Data Wireless ATM Network Development

Lightwave Communications, Software Radios,
CDMA Capacity Assignment, RF Channel Simulation,
Rapidly Deployable Radio Network (RDRN), DSP using FPGAs



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Importance of Advances in Lightwave Communications Research

- Enabling technology:

25,000 GHz/fiber @ 2.0 bits/Hz
~ 50,000 Gbps/fiber



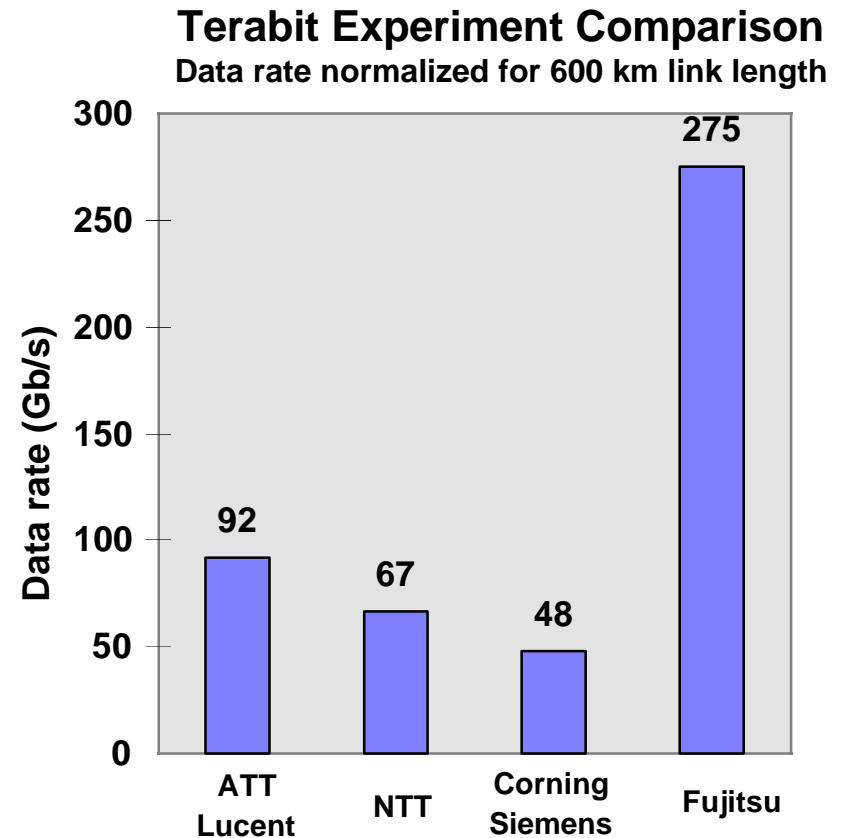
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Terabit/s 'Hero' Experiments

	AT&T Lucent	NTT	Corning Siemens	Fujitsu
# of channels	50	10	8	55
Gb/s per channel	20	100	10	20
Total bit rate (Gb/s)	1000	1000	80	1100
link length (km)	55	40	360	150
channel spacing (GHz)	100	400	200	75
log(BER)	?	?	-17	-11
Amp. spacing (km)	NA		90	50

source: "OFC post-deadline talks tout terabit transmission,"
Lightwave, pages 6, 8, 11, April 1996



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Some Problems in Lightwave Communications

- Fiber dispersion
- High speed pulse transmission and clock recovery
- Slow wavelength switching and routing
- Ineffective optical logic elements



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Importance of Advances in Wireless Communications and Digital Signal Processing

- Enabling technology: *Digital transmission and Processing*
- Potential for advanced features providing widespread *Mobility* for:
 - Web
 - Graphics/Image
 - Video



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Some Problems in Wireless Communications and Digital Signal Processing

- Achieving high data rates over radio channels
- Overcoming power limitations
- Flexibility: accommodating different formats and modulations



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Importance of Advances in Networking and Distributed Systems

- Enabling technology: *Ubiquitous high bandwidth to customers*
- Potential for integrated access to:
 - Distributed processing
 - Web
 - Video
 - Graphics/Image



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Some Problems in Networking and Distributed Systems

- Guaranteeing Quality of Service in heterogeneous networks
- Efficient use of transmission facilities with heterogeneous traffic
- Scale:
 - Numbers of users
 - Global network coverage
- Rapidly changing technologies



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Importance of Intelligent Systems and Information Management

- Enabling technologies:
 - *High bandwidth to customers*
 - *Availability of low-cost computing and memory*
- Potential for:
 - Intelligent agents
 - Personalized information management
 - Highly customized services
 - Context based services



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Some Problems in Intelligent Systems and Information Management

- Coping with massive data sets
- Scale:
 - Numbers of users
 - Global network coverage
- Security
- Rapidly changing technologies



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Summary

- The University of Kansas **Information and Telecommunications Center** brings together academic and research expertise as well as the facilities required for the development of the Global Information Infrastructure.
 - **Lightwave**
 - **Wireless and Digital Signal Processing**
 - **Networking**
 - **Intelligent Systems and Network Based Applications**
- It is our goal to remain at the forefront of the creation of the enabling technologies for the Information Age



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