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National Information Infrastructure (NII) Future Mapping

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**Mapping the Future of ...
The Information Highway:
The Great Infrastructure Debate**

Common Events

Team Votes					Overall Consensus				#	Year	Title
A	B	C	D	E	HL	HU	UQ	CM			
+	+		-	+					Y	Y	131 1994 Cross-Ownership Ban Eliminated
-	-		-	+	Y				Y	Y	46 1994 Key Content Providers Set up Cross Ownership With Carriers
+	+	+	+	+	Y					Y	18 1995 Business Information Services Take Off
+	+	+	-						Y	Y	31 1995 Carriers Offer Public Key Crypto Directories
	-	+	-	+	Y					Y	140 1995 LECs Allowed to Own Content
+	-	+	+	+	Y				Y	Y	154 1995 New Local Loop Entrants Required to Support Universal Service Goals
+	+		+	+	Y					Y	136 1995 Telecom Reform Signed Into Law
	+	+	+	+						Y	3 1996 Consumer Electronic Commerce Flourishes
-	-		-	+	Y				Y	Y	53 1996 Joint Ventures of Telcos and Newspaper Chains Common
+	-	-		+	Y					Y	109 1997 Errant Agents Run Wild
	+	+	+	+	Y					Y	6 1998 Electronic Bazaars Take Off
+	+	+		+	Y					Y	153 1999 Rate Base Regulation Abandoned in Majority of States
+		+	-	+	Y				Y	Y	162 1999 The Internet Diminishes to a Set of Services and Standards

Team Votes
+ = Must
- = Must Not

Overall Consensus
HL = Highly Likely UQ = Unique Event
HU = Highly Unlikely CM = Common Event

Summary Statistics

Total Number of Events: 213
 Number of Highly Likely Events: 59 (27.7%)
 Number Highly Unlikely Events: 10 (4.7%)
 Number of Common Events: 13 (6.1%)
 Number of Unique Events: 76 (35.7%)

	Total	Common
Number of Team A Events:	42	10
Number of Team B Events:	47	12
Number of Team C Events:	45	9
Number of Team D Events:	44	11
Number of Team E Events:	58	12

Mapping the Future of ...
The Information Highway:
The Great Infrastructure Debate

Highly Likely/Highly Unlikely Composite Results

Team Votes					Overall Consensus		# Year Title	L = Highly Likely U = Highly Unlikely Y = Yes
A	B	C	D	E	Highly Likely	Highly Unlikely		

Major Category: Service Offerings & Markets

Electronic Commerce							
	L	L		L	Y		1 1995 Banks Step Into the Role of Transaction Service Providers
U	L	L	U	U			2 1995 Dialog/CCC Venture Clears Rights Automatically
L	L	L	U	L	Y		3 1996 Consumer Electronic Commerce Flourishes
L		U		L			4 1996 Infomercials On the Internet
L	L	L	U	L	Y		5 1998 Advertising Dollars Shifted From Broadcast Networks to Cable Microsegments
L	L		U	L			6 1998 Electronic Bazaars Take Off
U		L		U			7 1998 Global and Regional Electronic Markets Widely Used
U	L	L					8 1999 Shopping Becomes the Dominant Form of Paying for Home Multimedia Services
							9 2000 Gtech Wins Electronic Gambling Contract in U.S.
Video & Multimedia Services							
U	L	L	U	L			10 1995 CNN Offers Multimedia News Broadcast Directly to PCs
U	L	L		L			11 1995 Distributed Interactive Video Games Take Off
U	U	L					12 1995 Video on Demand Prices Competitive With Video Rentals
	L	L	U				13 1997 30% of All Magazines Accessible Via On-line Services
	L	L		L	Y		14 1997 Multimedia Applications Take Hold in Vertical Industries
U			U				15 1997 Shared Virtual Reality Explodes
U	L						16 2000 Video on Demand Revenue Covers Fixed Costs of New Networks
U	L	U	U	L			17 2000 World Movie Library Established
Business Info Services							
L	L	L	L	L	Y		18 1995 Business Information Services Take Off
U	L		L	L			19 1995 Electronic Meeting Facilitation Products Take Off
U	L	L	L	L	Y		20 1997 Government Data Repackagers Thrive
	L	U		L			21 1998 Information Refineries Common
Wireless Services							
L	L	L	L	L	Y		22 1994 AT&T Introduces Wireless E-Mail
U		L	L	U			23 1996 \$50 Personal Communicators Widely Available
L	L		L		Y		24 1996 PCS Build-outs Target Affluent Communities of Interest
U	L		L	U			25 1997 10% of New Local Residential Telephone Access Installations Are Wireless
		L					26 1997 Nextel's SMR Bet Pays Off
L	L	L	L	L	Y		27 1998 Wireless Systems Offer Location-Specific Info Services
			L	U			28 2000 Spectrum Glut Expected to Persist for Years
Communications Services							
U	L	L	L	L	Y		29 1994 All Major On-line Services Accessible From the Internet
U	L	U		L			30 1994 Vertical Market Consortia Formed to Build Broadband Networks
		L					31 1995 Carriers Offer Public Key Crypto Directories

Mapping the Future of ...
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Highly Likely/Highly Unlikely Composite Results

Team Votes					Overall Consensus		# Year Title
A	B	C	D	E	Highly Likely	Highly Unlikely	
U	L	L	L	L	Y		32 1996 10 Mbs Internet Access Through Cable For \$50 Per Month
L	L	L	L	L	Y		33 1996 Business Users Demand End-to-End ATM
L	L						34 1997 ATM/OC3 Public Network Connections Hits \$10,000/Month
L	L	L	L	L	Y		35 1997 CLE Support Services are Hot
	L		L				36 1997 Flat Rate Billing Dominates Broadband

L = Highly Likely U = Highly Unlikely Y = Yes

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Highly Likely/Highly Unlikely Composite Results

Team Votes					Overall Consensus		# Year Title
A	B	C	D	E	Highly Likely	Highly Unlikely	

L = Highly Likely U = Highly Unlikely Y = Yes

Major Category: Industry Structure

Competitive Structure							
L		L	L		Y		37 1995 On-line Info Prices Plummet; Demand Surges
L		L	L	L	Y		38 1995 RBOC Launches Competitive Service on Cable TV Plant
		L	L				39 1996 Cable Operator in Competitive Market Offers POTS for "Free"
				U			40 1996 PCS Service Pricing Equals Wireline
	L		L	L	Y		41 1997 Electric Utilities Enter the Public Network Business
U	L	L	L	L			42 1998 Network Operators Gain Through Specialization
							43 2000 RBOC Regions No Longer Relevant

Alliances							
U		L	U	U			44 1994 A Global IXC Emerges
L	L	L	L	L	Y		45 1994 Joint Cable/Commercial Internet Service Launched
L		L	L	L	Y		46 1994 Key Content Providers Set up Cross Ownership With Carriers
U		U	L				47 1994 Switch Vendor and RHC Announce Joint Venture for Broadband Products
		L	L	L	Y		48 1995 Cable TV-Led JVs Offer PCS Service
		L	L	L	Y		49 1995 Equipment Providers Take Cash Alternatives
U		U	L				50 1995 LECs Lease Access From Cable TV
			U				51 1995 MobileLink Cellular Consortium Splits Up
L	L	L		L	Y		52 1996 AT&T/MFS Alliance Signed
L		L	L		Y		53 1996 Joint Ventures of Telcos and Newspaper Chains Common
L	L	L	L	L	Y		54 1998 New Entrants Outsource Some Infrastructure Services

Mergers and Acquisitions							
U		U	U	L			55 1994 A Large Computer Hardware Vendor Acquires Major American Publishing Houses
		L		L			56 1995 BT/MCI Adds Computer Company to its Fold
U			U	U	Y		57 1995 Cable TV Vendor Purchases RHC Local Franchise
U			U	U	Y		58 1996 RBOCs Skip Dividends; Investors Dump Stocks
L	L	L	U	L	Y		59 1996 Shakeout Among Internet Services Providers Complete (For A While)
U				U			60 1997 Bell Atlantic/NYNEX Merger Complete

Market Share							
U	L	L	U	L	Y		61 1995 Ameritech Captures U S WEST's IXC Access Revenue
U	L	L		U			62 1996 "Industrial Strength" Commercial Data Networks Prevail
U	L	L	L	U			63 1996 CAPs Take 30% of IXC Access Revenue in Top 30 Metro Areas
	L	U		L			64 1997 Cable TV System Wins 25% of Home Voice Accounts in a Major City
		L					65 1998 Non-Voice Services Are Majority of Services Revenue
							66 1998 Teleport is Fastest Growing Competitive Access Provider
U							67 1999 AT&T/McCaw Achieves 20% Residential Access Share in Top 20 Markets

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Highly Likely/Highly Unlikely Composite Results

Team Votes					Overall Consensus		#	Year	Title
A	B	C	D	E	Highly Likely	Highly Unlikely			

L = Highly Likely U = Highly Unlikely Y = Yes

Major Category: Infrastructure Technology

Access/Distribution									
L		L	L	L	Y		68	1995	Most New Systems are Biased to Program Delivery
	U	L	L	U			69	1995	Most POTS Infrastructure Retired, Not Upgraded
		L	L				70	1996	Local Loop Upgrade Cost Hits \$1000 Per Installation Mark
U		U	L	L			71	1996	Universal Fiber Termination (UFT) Replaces Small COs
L		U	U	U			72	1997	Hybrid Systems Combining the Cable TV and LEC Plant are Common
		L	L	L	Y		73	2000	Hybrid Fiber/COAX Systems Require Continuing Segmentation
U	L	L		U			74	2000	Ubiquitous Bandwidth Symmetry Becoming Apparent

Transmission and Switching									
U	L	L	L	L	Y		75	1994	Video and Image Compression Achieve Transmission Savings
U		L	U	L			76	1996	Cable Systems Interconnect Well Underway
		L					77	1996	U S WEST/Time Warner Full Service Network Trial In Orlando Fails
U	L	L					78	1997	Only 45% of Public Network Traffic Requires True Real-Time Response
U	L	U	L				79	1997	SONET Deployed in Most Major Residential Markets
	L		U	U			80	1999	10 Gbps Satisfies Majority of CO Needs
	L	U	U	U			81	2000	The Negreponde Switch Is Largely Complete

Intelligent Network									
U		L	L	U			82	1994	Central Office Servers Proliferate
		L	L	L	Y		83	1997	Advanced Intelligent Network Widely Deployed
	L	L	L	L	Y		84	1997	Distributed VoD Systems Optimized for Fast I/O
		U	U	U		Y	85	1997	Massively Parallel Systems Dominate VoD
L	L	L	L	L	Y		86	1999	Agent Technology Allows AT&T to Find You Anywhere

Network Control Systems									
U	U		U	U		Y	87	1994	Object Class Libraries Developed for RHCs
		L		U			88	1998	National Conversion to Non-Geographic Numbering
U	L		U				89	1998	TMN Standard Widely Deployed
		L					90	1999	Common Management Systems Support All Services
		U	U	L			91	1999	INA Widely Implemented

Wireless									
U		L					92	1995	McCaw Completes CPDP Rollout
L		L	U	L			93	1995	Small Dish, Direct Broadcast Service to Homes Competitive With Cable
	L		L				94	1996	CDMA Deployment Begins
U		L		U			95	1996	Sharing of Unlicensed Spectrum Breaks Down
		L					96	1998	PCS Relocation Process Stalls Build-out

Standards

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Highly Likely/Highly Unlikely Composite Results

Team Votes					Overall Consensus		# Year Title
A	B	C	D	E	Highly Likely	Highly Unlikely	
	L	L		U			97 1994 IETF/SOC Endorses CLNP as Next TCP/IP Addressing Standard
U	L		L	U		Y	98 1995 General Magic's Telescript Becomes Standard for PDA Communications
		U	U	U			99 1995 Information Metering and Control Technology Standard Implemented
L		U	U	U			100 1996 Variable Cell ATM Video Standard Approved
	L	L					101 1998 Carriers Offer X.500 Directory Services

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Highly Likely/Highly Unlikely Composite Results

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A	B	C	D	E	Highly Likely	Highly Unlikely	

L = Highly Likely U = Highly Unlikely Y = Yes

Major Category: Home and Office Technology

User Interfaces							
	L	L	L	L	Y		102 1995 Common Desktop Applications Become Front Ends to EDI, OLTP and E-Mail
	L	L	L	L	Y		103 1995 Mosaic is the Rave Application of 1995
L	L	L	L	L	Y		104 1995 Telecom Company Provides GUIs to Promote Home Multimedia Services
				L			105 1996 General Magic's MagicCap® User Interface Widely Implemented
		L					106 1997 MUDS and MOOS Develop Into User Interfaces to Different "Destinations"

Navigation and Agents							
U	L	U		L			107 1994 Agent Software Enhances User Productivity
	L	L	L	L	Y		108 1996 Passive Intelligent Agents Filter By Concept
L	L	L	L	L	Y		109 1997 Errant Agents Run Wild
		L					110 1997 X.500 White Pages Widely Deployed on Internet
		U		L			111 1998 Network-based "Knowbots®" Become Widely Used

MultiMedia and Video							
U	L	U	L				112 1995 Affordable 2-Way Video Conferencing Widespread
U	L	L	L	L	Y		113 1995 Easy to Use Multimedia Authoring Tools Under \$200
U		U	U	U		Y	114 1995 Settop Box Standard Announced
U		U					115 1995 VROS Environment Accelerates Virtual Reality Application Development
	L	U	L	L			116 1996 Digital Video Sparks a Creative, Populist Revolution in Low Cost Production
	L	L	L	U			117 1996 Professional Video Editing Tools Widely Available for \$1,000

Distributed Computing							
U		U	L	U			118 1994 Discontinuous Operation Problem Solved
	L	L	L	L	Y		119 1994 Users Invest in Software Distribution and Control Systems
	L	L	L	L	Y		120 1995 E-mail Traffic Increases 10X In Fortune 500; Embedded Files The Cause
	L	U					121 1995 Full Solution to the Distributed DBMS Problem Available
L	L	L	L		Y		122 1995 Microsoft Bundles Internet Access/Interfaces With Windows
		U					123 1996 Broadband Network Operating System Takes Off
L	L	L	L	L	Y		124 1996 More Than 50% of New Laptops and PDAs Ship With Some Nomadic Software
L	L	L	L	L	Y		125 1998 Server Network Interfaces at 622Mbs Hit the Market

LANs							
	L	L	L	L	Y		126 1995 Private ATM Networks Take Off
U	L	U					127 1996 ATM Per Port Costs At \$300/OC3
U		U	U	U		Y	128 1996 Wireless LANs Serve 25% of Installed Desktop and Portable Computers in the U.S.
U		U	L				129 1997 Moving Voice Onto LANs Is Cheaper Than Buying a PBX
U	L	U		U			130 1998 LANs in the Home Become Common

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Highly Likely/Highly Unlikely Composite Results

Team Votes					Overall Consensus		#	Year Title
A	B	C	D	E	Highly Likely	Highly Unlikely		

L = Highly Likely U = Highly Unlikely Y = Yes

Major Category: Government & Regulation

Legislation								
U	L	U	L	L				131 1994 Cross-Ownership Ban Eliminated
U		U	L	L		Y		132 1994 Education Subsidy Bills Passed
U		U	U					133 1994 On-line Services Defined as Common Carriers
L	L	L	U	U				134 1995 Feds Commit \$1.5 Billion Annually to Info Highway Research
L	L	L	L	L	Y			135 1995 Reuse of Market Data Brings Threat of Regulation from Congress
		L	L	L	Y			136 1995 Telecom Reform Signed Into Law
		U	L	U				137 1996 Broad Wiretap Bill Enacted
		U	U					138 1996 Copyright Laws Changed for Network Transmission
Courts								
L		L	L	U				139 1995 Iron Clad Digital Signatures Accepted
		L	L	L	Y			140 1995 LECs Allowed to Own Content
		L	L					141 1995 Supreme Court Upholds Free Speech Rights of E-mail and Bulletin Board Users
Agency Activity								
L		U	L	L				142 1994 FCC Completes PCS Auctions
		U		U				143 1995 Federal Gov't Mandates IT Training For Senior Gov't Managers
	L	L	L	U				144 1996 CAP Services Subject to ONA
U		L		U				145 1996 Federal Government Implements Three Year IT Cycles
	L	L						146 1997 Compulsory Clipper Security Abandoned As Mafia Gets Keys
U		U		U		Y		147 1997 Metering Technology Mandated
L	L	L		L	Y			148 1997 Public Electronic Mail Surpasses First Class U.S. Mail
State and Local								
U	L	U		L				149 1995 Chicago Declares the City a Telecom Free Trade Zone
L	L	L			Y			150 1996 PUCs Prioritize Equal Access
U		L	L					151 1997 Interactive Lottery Triples Take in California
U	L	L	U					152 1998 NARUC Advocates Reduced Role for States
L	L	L	L	L	Y			153 1999 Rate Base Regulation Abandoned in Majority of States
Universal Service								
L		L	L	L	Y			154 1995 New Local Loop Entrants Required to Support Universal Service Goals
U	L	L		L				155 1996 Universal Service Tax Approved
		L	L	L	Y			156 1997 PUCs Administer Universal Service Rules
		L						157 1997 Universal Access Board Exempt from Anti-Trust
Internet Administration								
L	L	L	L	U	Y			158 1994 Restructuring of NSFNET/Internet Delayed
U	U	U		L				159 1995 CIX Members Institute Usage-Based Pricing and Inter-Carrier Settlements

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Highly Likely/Highly Unlikely Composite Results

Team Votes					Overall Consensus		# Year Title
A	B	C	D	E	Highly Likely	Highly Unlikely	
U	U	U		U		Y	160 1997 Congress Mandates NIST Control of Internet Standards
L	L	L	L	U	Y		161 1997 Internet Forum Created
L	L	L	L	L	Y		162 1999 The Internet Diminishes to a Set of Services and Standards
Government Services							
U	L	L		L			163 1998 Government Services Kiosks Widespread
	L	U	L				164 1999 Government-wide E-mail Instituted

L = Highly Likely U = Highly Unlikely Y = Yes

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Highly Likely/Highly Unlikely Composite Results

Team Votes					Overall Consensus		# Year Title	L = Highly Likely U = Highly Unlikely Y = Yes
A	B	C	D	E	Highly Likely	Highly Unlikely		

Major Category: Social/Demographics

Impact on Consumers							
U	L	L	U	U			165 1997 25% of TV News Viewers Use Available Interactive Text Features
	L	L	U	U			166 1997 Community Built Portion of Internet Widely Popular
	L	L	L		Y		167 1998 Interactive Networks Promote Action and Enrich Community

Impact on Business							
L	L	U	L	U			168 1996 Video Messaging and Conferencing Replace an Estimated 15% of Meeting Travel
	L	L	L	U			169 1997 Infotactics Becomes a Common Element of Strategy
	L	L	L	L	Y		170 1998 The Virtual Conference Room Paradigm Widely Accepted
	L	L		L	Y		171 2000 Information Superhighway Credited with Rise in GDP

Education							
L	L		L	U			172 1996 College and Publisher Alliances Drive Distance Learning Market
	L	L	L	L	Y		173 1997 50% Secondary Schools Have Internet Connection
U		U					174 1997 SAT Exams Only Offered On-Line

Norms and Values							
U	L	L	L				175 1995 Pornography Accounts for 20% of Internet Traffic
L	L	L	L	L	Y		176 1996 Personal Privacy Becomes a Campaign Issue
							177 1998 Study Finds Three Tiers of Information Highway Users

Summary Statistics

Total Number of Events: 177
Number of Highly Likely Events: 59 (33.3%)
Number Highly Unlikely Events: 10 (5.6%)

Number of Team A Highly Likely + Highly Unlikely Events: 107
Number of Team B Highly Likely + Highly Unlikely Events: 101
Number of Team C Highly Likely + Highly Unlikely Events: 150
Number of Team D Highly Likely + Highly Unlikely Events: 119
Number of Team E Highly Likely + Highly Unlikely Events: 126

**Mapping the Future of ...
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Highly Likely/Highly Unlikely Scenario

Team Votes					Overall Consensus		#	Year	Title
A	B	C	D	E	Highly Likely	Highly Unlikely			
U	L	L	L	L	Y		29	1994 All Major On-line Services Accessible From the Internet	
L	L	L	L	L	Y		22	1994 AT&T Introduces Wireless E-Mail	
L	L	L	L	L	Y		45	1994 Joint Cable/Commercial Internet Service Launched	
L		L	L	L	Y		46	1994 Key Content Providers Set up Cross Ownership With Carriers	
U	U		U	U		Y	87	1994 Object Class Libraries Developed for RHCs	
U		U	U			Y	133	1994 On-line Services Defined as Common Carriers	
L	L	L	L	U	Y		158	1994 Restructuring of NSFNET/Internet Delayed	
U	L	L	L	L	Y		119	1994 Users Invest in Software Distribution and Control Systems	
U	L	L	L	L	Y		75	1994 Video and Image Compression Achieve Transmission Savings	
	L	L		L	Y		1	1995 Banks Step Into the Role of Transaction Service Providers	
L	L	L	L	L	Y		18	1995 Business Information Services Take Off	
U			U	U		Y	57	1995 Cable TV Vendor Purchases RHC Local Franchise	
		L	L	L	Y		48	1995 Cable TV-Led JVs Offer PCS Service	
	L	L	L	L	Y		102	1995 Common Desktop Applications Become Front Ends to EDI, OLTP and E-Mail	
	L	L	L	L	Y		120	1995 E-mail Traffic Increases 10X In Fortune 500; Embedded Files The Cause	
U	L	L	L	L	Y		113	1995 Easy to Use Multimedia Authoring Tools Under \$200	
		L	L	L	Y		49	1995 Equipment Providers Take Cash Alternatives	
		U	U	U		Y	99	1995 Information Metering and Control Technology Standard Implemented	
L		L		L	Y		140	1995 LECs Allowed to Own Content	
L	L	L	L		Y		122	1995 Microsoft Bundles Internet Access/Interfaces With Windows	
	L	L	L	L	Y		103	1995 Mosaic is the Rave Application of 1995	
L		L	L	L	Y		68	1995 Most New Systems are Biased to Program Delivery	
L		L	L	L	Y		154	1995 New Local Loop Entrants Required to Support Universal Service Goals	
L		L	L		Y		37	1995 On-line Info Prices Plummet; Demand Surges	
	L	L	L	L	Y		126	1995 Private ATM Networks Take Off	
L		L	L	L	Y		38	1995 RBOC Launches Competitive Service on Cable TV Plant	
L	L	L	L	L	Y		135	1995 Reuse of Market Data Brings Threat of Regulation from Congress	
U		U	U	U		Y	114	1995 Settop Box Standard Announced	
L	L	L	L	L	Y		104	1995 Telecom Company Provides GUIs to Promote Home Multimedia Services	
		L	L	L	Y		136	1995 Telecom Reform Signed Into Law	
U	L	L	L	L	Y		62	1996 "Industrial Strength" Commercial Data Networks Prevail	
U	L	L	L	L	Y		32	1996 10 Mbs Internet Access Through Cable For \$50 Per Month	
L	L	L		L	Y		52	1996 AT&T/MFS Alliance Signed	
L	L	L	L	L	Y		33	1996 Business Users Demand End-to-End ATM	
L	L	L	U	L	Y		4	1996 Infomercials On the Internet	
L		L	L		Y		53	1996 Joint Ventures of Telcos and Newspaper Chains Common	

L = Highly Likely U = Highly Unlikely Y = Yes

**Mapping the Future of ...
The Information Highway:
The Great Infrastructure Debate**

Highly Likely/Highly Unlikely Scenario

Team Votes					Overall Consensus		#	Year	Title
A	B	C	D	E	Highly Likely	Highly Unlikely			
L	L	L	L	L	Y		124	1996	More Than 50% of New Laptops and PDAs Ship With Some Nomadic Software
	L	L	L	L	Y		108	1996	Passive Intelligent Agents Filter By Concept
L	L		L		Y		24	1996	PCS Build-outs Target Affluent Communities of Interest
L	L	L			Y		150	1996	PUCs Prioritize Equal Access
U			U	U		Y	58	1996	RBOCs Skip Dividends; Investors Dump Stocks
L	L	L	U	L	Y		59	1996	Shakeout Among Internet Services Providers Complete (For A While)
U		U	U	U		Y	128	1996	Wireless LANs Serve 25% of Installed Desktop and Portable Computers in the U.S.
	L	L	L	L	Y		173	1997	50% Secondary Schools Have Internet Connection
		L	L	L	Y		83	1997	Advanced Intelligent Network Widely Deployed
L	L	L	L	L	Y		35	1997	CLE Support Services are Hot
U	U	U		U		Y	160	1997	Congress Mandates NIST Control of Internet Standards
	L	L	L	L	Y		84	1997	Distributed VoD Systems Optimized for Fast I/O
L	L	L	L	L	Y		109	1997	Errant Agents Run Wild
U	L	L	L	L	Y		20	1997	Government Data Repackagers Thrive
L	L	L	L	U	Y		161	1997	Internet Forum Created
		U	U	U		Y	85	1997	Massively Parallel Systems Dominate VoD
U		U		U		Y	147	1997	Metering Technology Mandated
	L	L		L	Y		14	1997	Multimedia Applications Take Hold in Vertical Industries
L	L	L		L	Y		148	1997	Public Electronic Mail Surpasses First Class U.S. Mail
		L	L	L	Y		156	1997	PUCs Administer Universal Service Rules
L	L	L	U	L	Y		6	1998	Electronic Bazaars Take Off
	L	L	L		Y		167	1998	Interactive Networks Promote Action and Enrich Community
	L		L	L	Y		42	1998	Network Operators Gain Through Specialization
L	L	L	L	L	Y		54	1998	New Entrants Outsource Some Infrastructure Services
L	L	L	L	L	Y		125	1998	Server Network Interfaces at 622Mbps Hit the Market
L	L	L	L	L	Y		177	1998	Study Finds Three Tiers of Information Highway Users
	L	L	L	L	Y		170	1998	The Virtual Conference Room Paradigm Widely Accepted
L	L	L	L	L	Y		27	1998	Wireless Systems Offer Location-Specific Info Services
L	L	L	L	L	Y		86	1999	Agent Technology Allows AT&T to Find You Anywhere
L	L	L	L	L	Y		153	1999	Rate Base Regulation Abandoned in Majority of States
L	L	L	L	L	Y		162	1999	The Internet Diminishes to a Set of Services and Standards
		L	L	L	Y		73	2000	Hybrid Fiber/COAX Systems Require Continuing Segmentation
	L	L		L	Y		171	2000	Information Superhighway Credited with Rise in GDP

L = Highly Likely U = Highly Unlikely Y = Yes

Mapping the Future of ...
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 The Great Infrastructure Debate

Highly Likely/Highly Unlikely Scenario

Team Votes					Overall Consensus		# Year Title	L = Highly Likely U = Highly Unlikely Y = Yes
A	B	C	D	E	Highly Likely	Highly Unlikely		

Summary Statistics

Total Number of Events: 177
 Number of Highly Likely Events: 59 (33.3%)
 Number Highly Unlikely Events: 10 (5.6%)

Highly Likely and Highly Unlikely Voting by Team

	Likely	Unlikely
Number of Team A Events:	43	64
Number of Team B Events:	96	5
Number of Team C Events:	107	43
Number of Team D Events:	84	35
Number of Team E Events:	80	46

**Mapping the Future of ...
The Information Highway:
The Great Infrastructure Debate**

Final Results

Team Votes					Overall Consensus				Team Votes	Overall Consensus	
A	B	C	D	E	HL	HU	UQ	CM	#	Year	Title

Team Votes
 + = Must
 - = Must Not

Overall Consensus
 HL = Highly Likely UQ = Unique Event
 HU = Highly Unlikely CM = Common Event

Major Category: Service Offerings & Markets

Electronic Commerce												
-			+	+	Y				Y			1 1995 Banks Step Into the Role of Transaction Service Providers
		+	+	+							Y	2 1995 Dialog/CCC Venture Clears Rights Automatically
	+	+	+	+								3 1996 Consumer Electronic Commerce Flourishes
			+		Y				Y			4 1996 Infomercials On the Internet
												5 1998 Advertising Dollars Shifted From Broadcast Networks to Cable Microsegments
	+	+	+	+	Y						Y	6 1998 Electronic Bazaars Take Off
	+			+								7 1998 Global and Regional Electronic Markets Widely Used
				+								8 1999 Shopping Becomes the Dominant Form of Paying for Home Multimedia Services
												9 2000 Gtech Wins Electronic Gambling Contract in U.S.

Video & Multimedia Services												
			+							Y		10 1995 CNN Offers Multimedia News Broadcast Directly to PCs
	+	+		+								11 1995 Distributed Interactive Video Games Take Off
	+		+	+								12 1995 Video on Demand Prices Competitive With Video Rentals
			+	+								13 1997 30% of All Magazines Accessible Via On-line Services
	+			+	Y							14 1997 Multimedia Applications Take Hold in Vertical Industries
				+						Y		15 1997 Shared Virtual Reality Explodes
			+							Y		16 2000 Video on Demand Revenue Covers Fixed Costs of New Networks
												17 2000 World Movie Library Established

Business Info Services												
+	+	+	+	+	Y						Y	18 1995 Business Information Services Take Off
+											Y	19 1995 Electronic Meeting Facilitation Products Take Off
			+		Y						Y	20 1997 Government Data Repackagers Thrive
			+								Y	21 1998 Information Refineries Common

Wireless Services												
	+				Y						Y	22 1994 AT&T Introduces Wireless E-Mail
					Y							23 1996 \$50 Personal Communicators Widely Available
												24 1996 PCS Build-outs Target Affluent Communities of Interest
+												25 1997 10% of New Local Residential Telephone Access Installations Are Wireless
+												26 1997 Nextel's SMR Bet Pays Off
			+		Y							27 1998 Wireless Systems Offer Location-Specific Info Services
	+		+									28 2000 Spectrum Glut Expected to Persist for Years

Communications Services												
-	-	+	+	-	Y						Y	29 1994 All Major On-line Services Accessible From the Internet
	+	+	-	+								30 1994 Vertical Market Consortia Formed to Build Broadband Networks
+	+	+									Y	31 1995 Carriers Offer Public Key Crypto Directories

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Final Results

Team Votes					Overall Consensus				#	Year	Title
A	B	C	D	E	HL	HU	UQ	CM			
	+	+		+	Y					32	1996 10 Mbs Internet Access Through Cable For \$50 Per Month
	+			+	Y					33	1996 Business Users Demand End-to-End ATM
	+							Y		34	1997 ATM/OC3 Public Network Connections Hits \$10,000/Month
	+			+	Y					35	1997 CLE Support Services are Hot
	+	+								36	1997 Flat Rate Billing Dominates Broadband

Team Votes
 + = Must
 - = Must Not

Overall Consensus
 HL = Highly Likely UQ = Unique Event
 HU = Highly Unlikely CM = Common Event

Mapping the Future of ...
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Final Results

Team Votes					Overall Consensus				#	Year	Title
A	B	C	D	E	HL	HU	UQ	CM			

Team Votes
+ = Must
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Overall Consensus	
HL = Highly Likely	UQ = Unique Event
HU = Highly Unlikely	CM = Common Event

Major Category: Industry Structure

Competitive Structure

-		+			Y			Y		37 1995 On-line Info Prices Plummet; Demand Surges
+		+		+	Y					38 1995 RBOC Launches Competitive Service on Cable TV Plant
+								Y		39 1996 Cable Operator in Competitive Market Offers POTS for "Free"
+								Y		40 1996 PCS Service Pricing Equals Wireline
+			+	+						41 1997 Electric Utilities Enter the Public Network Business
	+			+	Y					42 1998 Network Operators Gain Through Specialization
+				+						43 2000 RBOC Regions No Longer Relevant

Alliances

+	+				+	Y		Y		44 1994 A Global IXC Emerges
-	-		-	+	Y			Y	Y	45 1994 Joint Cable/Commercial Internet Service Launched
										46 1994 Key Content Providers Set up Cross Ownership With Carriers
+				+	Y					47 1994 Switch Vendor and RHC Announce Joint Venture for Broadband Products
				+	Y			Y		48 1995 Cable TV-Led JVs Offer PCS Service
-								Y		49 1995 Equipment Providers Take Cash Alternatives
+								Y		50 1995 LECs Lease Access From Cable TV
+	-				Y			Y		51 1995 MobileLink Cellular Consortium Splits Up
-	-		-	+	Y			Y	Y	52 1996 AT&T/MFS Alliance Signed
	+				Y			Y		53 1996 Joint Ventures of Telcos and Newspaper Chains Common
					Y			Y		54 1998 New Entrants Outsource Some Infrastructure Services

Mergers and Acquisitions

-								Y	Y	55 1994 A Large Computer Hardware Vendor Acquires Major American Publishing House
								Y	Y	56 1995 BT/MCI Adds Computer Company to its Fold
				-						57 1995 Cable TV Vendor Purchases RHC Local Franchise
+				+	Y					58 1996 RBOCs Skip Dividends; Investors Dump Stocks
										59 1996 Shakeout Among Internet Services Providers Complete (For A While)
										60 1997 Bell Atlantic/NYNEX Merger Complete

Market Share

+	+				+	Y				61 1995 Ameritech Captures U S WEST's IXC Access Revenue
+								Y		62 1996 "Industrial Strength" Commercial Data Networks Prevail
										63 1996 CAPs Take 30% of IXC Access Revenue in Top 30 Metro Areas
										64 1997 Cable TV System Wins 25% of Home Voice Accounts in a Major City
			+	+						65 1998 Non-Voice Services Are Majority of Services Revenue
										66 1998 Teleport is Fastest Growing Competitive Access Provider
										67 1999 AT&T/McCaw Achieves 20% Residential Access Share in Top 20 Markets

**Mapping the Future of ...
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Final Results**

Team Votes					Overall Consensus				Team Votes	Overall Consensus	
A	B	C	D	E	HL	HU	UQ	CM	#	Year	Title

Team Votes
+ = Must
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Overall Consensus	
HL = Highly Likely	UQ = Unique Event
HU = Highly Unlikely	CM = Common Event

Major Category: Infrastructure Technology

Access/Distribution

+		+	+		Y		Y		68	1995	Most New Systems are Biased to Program Delivery
	+		+	+					69	1995	Most POTS Infrastructure Retired, Not Upgraded
	+								70	1996	Local Loop Upgrade Cost Hits \$1000 Per Installation Mark
									71	1996	Universal Fiber Termination (UFT) Replaces Small COs
	+						Y		72	1997	Hybrid Systems Combining the Cable TV and LEC Plant are Common
					Y				73	2000	Hybrid Fiber/COAX Systems Require Continuing Segmentation
	+		-				Y		74	2000	Ubiquitous Bandwidth Symmetry Becoming Apparent

Transmission and Switching

-			+		Y		Y		75	1994	Video and Image Compression Achieve Transmission Savings
	-		+				Y		76	1996	Cable Systems Interconnect Well Underway
				+			Y		77	1996	U S WEST/Time Warner Full Service Network Trial In Orlando Fails
	+						Y		78	1997	Only 45% of Public Network Traffic Requires True Real-Time Response
			-				Y		79	1997	SONET Deployed in Most Major Residential Markets
							Y		80	1999	10 Gbps Satisfies Majority of CO Needs
									81	2000	The Negreonte Switch Is Largely Complete

Intelligent Network

+				+					82	1994	Central Office Servers Proliferate
+				+	Y				83	1997	Advanced Intelligent Network Widely Deployed
				+	Y			Y	84	1997	Distributed VoD Systems Optimized for Fast I/O
					Y			Y	85	1997	Massively Parallel Systems Dominate VoD
		+			Y				86	1999	Agent Technology Allows AT&T to Find You Anywhere

Network Control Systems

+			+				Y		87	1994	Object Class Libraries Developed for RHCs
									88	1998	National Conversion to Non-Geographic Numbering
									89	1998	TMN Standard Widely Deployed
+								Y	90	1999	Common Management Systems Support All Services
									91	1999	INA Widely Implemented

Wireless

	+	+		-				Y	92	1995	McCaw Completes CPDP Rollout
									93	1995	Small Dish, Direct Broadcast Service to Homes Competitive With Cable
									94	1996	CDMA Deployment Begins
	-							Y	95	1996	Sharing of Unlicensed Spectrum Breaks Down
	-							Y	96	1998	PCS Relocation Process Stalls Build-out

Standards

Mapping the Future of ...
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Final Results

Team Votes					Overall Consensus				#	Year	Title
A	B	C	D	E	HL	HU	UQ	CM			
	+			+						97	1994 IETF/ISOC Endorses CLNP as Next TCP/IP Addressing Standard
			+	-		Y		Y		98	1995 General Magic's Telescript Becomes Standard for PDA Communications
		-						Y		99	1995 Information Metering and Control Technology Standard Implemented
		+		-				Y		100	1996 Variable Cell ATM Video Standard Approved
										101	1998 Carriers Offer X.500 Directory Services

Team Votes
+ = Must
- = Must Not

Overall Consensus
HL = Highly Likely UQ = Unique Event
HU = Highly Unlikely CM = Common Event

**Mapping the Future of ...
The Information Highway:
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Final Results**

Team Votes					Overall Consensus				Team Votes	Overall Consensus							
A	B	C	D	E	HL	HU	UQ	CM	#	Year	Title	+ = Must	- = Must Not	HL = Highly Likely	HU = Highly Unlikely	UQ = Unique Event	CM = Common Event

Major Category: Home and Office Technology

User Interfaces																		
					Y													102 1995 Common Desktop Applications Become Front Ends to EDI, OLTP and E-Mail
		+	+		Y													103 1995 Mosaic is the Rave Application of 1995
+			-	+	Y						Y							104 1995 Telecom Company Provides GUIs to Promote Home Multimedia Services
				+							Y							105 1996 General Magic's MagicCap® User Interface Widely Implemented
																		106 1997 MUDS and MOOS Develop Into User Interfaces to Different "Destinations"

Navigation and Agents																		
				+	Y						Y							107 1994 Agent Software Enhances User Productivity
+	+	+			Y													108 1996 Passive Intelligent Agents Filter By Concept
	-	-		+	Y						Y							109 1997 Errant Agents Run Wild
		+																110 1997 X.500 White Pages Widely Deployed on Internet
																		111 1998 Network-based "Knowbots®" Become Widely Used

MultiMedia and Video																		
				+	Y						Y							112 1995 Affordable 2-Way Video Conferencing Widespread
	+	+			Y					Y	Y							113 1995 Easy to Use Multimedia Authoring Tools Under \$200
		+		-														114 1995 Settop Bqx Standard Announced
																		115 1995 VROS Environment Accelerates Virtual Reality Application Development
																		116 1996 Digital Video Sparks a Creative, Populist Revolution in Low Cost Production
	+			-							Y							117 1996 Professional Video Editing Tools Widely Available for \$1,000

Distributed Computing																		
			+		Y						Y							118 1994 Discontinuous Operation Problem Solved
					Y													119 1994 Users Invest in Software Distribution and Control Systems
					Y													120 1995 E-mail Traffic Increases 10X In Fortune 500; Embedded Files The Cause
				+	Y						Y							121 1995 Full Solution to the Distributed DBMS Problem Available
					Y													122 1995 Microsoft Bundles Internet Access/Interfaces With Windows
	+				Y													123 1996 Broadband Network Operating System Takes Off
	+			+	Y						Y							124 1996 More Than 50% of New Laptops and PDAs Ship With Some Nomadic Software
					Y													125 1998 Server Network Interfaces at 622Mbs Hit the Market

LANs																		
-					Y						Y							126 1995 Private ATM Networks Take Off
	+										Y							127 1996 ATM Per Port Costs At \$300/OC3
																		128 1996 Wireless LANs Serve 25% of Installed Desktop and Portable Computers in the
																		129 1997 Moving Voice Onto LANs Is Cheaper Than Buying a PBX
																		130 1998 LANs in the Home Become Common

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Final Results

Team Votes					Overall Consensus				Team Votes	Overall Consensus
A	B	C	D	E	HL	HU	UQ	CM	#	Year Title
-		-			Y	Y			160	1997 Congress Mandates NIST Control of Internet Standards
		+			Y		Y		161	1997 Internet Forum Created
+		+	-	+	Y		Y	Y	162	1999 The Internet Diminishes to a Set of Services and Standards
Government Services										
		+					Y		163	1998 Government Services Kiosks Widespread
		+					Y		164	1999 Government-wide E-mail Instituted

Team Votes
 + = Must
 - = Must Not

Overall Consensus
 HL = Highly Likely UQ = Unique Event
 HU = Highly Unlikely CM = Common Event

Mapping the Future of ...
The Information Highway:
The Great Infrastructure Debate
Final Results

Team Votes					Overall Consensus				# Year Title	
A	B	C	D	E	HL	HU	UQ	CM		

Team Votes
 + = Must
 - = Must Not

Overall Consensus
 HL = Highly Likely UQ = Unique Event
 HU = Highly Unlikely CM = Common Event

Major Category: Social/Demographics

Impact on Consumers											
			+	+							165 1997 25% of TV News Viewers Use Available Interactive Text Features
		+		+	Y						166 1997 Community Built Portion of Internet Widely Popular
											167 1998 Interactive Networks Promote Action and Enrich Community
Impact on Business											
		+		+	Y						168 1996 Video Messaging and Conferencing Replace an Estimated 15% of Meeting Tra
		+			Y			Y			169 1997 Infotactics Becomes a Common Element of Strategy
											170 1998 The Virtual Conference Room Paradigm Widely Accepted
											171 2000 Information Superhighway Credited with Rise in GDP
Education											
		+	+	+	Y						172 1996 College and Publisher Alliances Drive Distance Learning Market
		+	+		Y						173 1997 50% Secondary Schools Have Internet Connection
											174 1997 SAT Exams Only Offered On-Line
Norms and Values											
					Y						175 1995 Pornography Accounts for 20% of Internet Traffic
											176 1996 Personal Privacy Becomes a Campaign Issue
											177 1998 Study Finds Three Tiers of Information Highway Users

Mapping the Future of ... The Information Highway: The Great Infrastructure Debate

Final Results

Team Votes					Overall Consensus				Team Votes		Overall Consensus																		
A	B	C	D	E	HL	HU	UQ	CM	#	Year	Title	+	=	Must	-	=	Must Not	HL	=	Highly Likely	UQ	=	Unique Event	HU	=	Highly Unlikely	CM	=	Common Event

Major Category: New Events

											188	199	AD dollars shift from direct mail to niche Cable/Net
											200	1994	National bidding alliances form to participate in PCS spectrum auctions.
											201	1995	Alliances sealed with equity in new ventures not cross-ownership in partners
											212	1995	Clipper security abandoned
											180	1995	Direct electronic trading on networks by-passes brokerages
											182	1995	Fed. gov't's paranoia about crypto tech ends. US vendors allowed in world mkt
											178	1995	In-home cable controlled by home owner
											205	1995	STDs for Multimedia E-mail now account for discontinuous ops, High/low BW
											203	1995	Variable pricing of content mechanism available on net
											199	1995	Viacom acquires stake in VR arcade chain.
											204	1996	Agent mechanism builds from work for publishing very diverse content and
											196	1996	Alliance-specific security approaches proliferate
											208	1996	Basic settop box protocol STDs adopted
											198	1996	Businesses turn to carrier alliances offering virtual data net services
											211	1996	Fractal compression @ 2000:1 widely deployed
											183	1996	Government mandates schools and libraries connect to NII.
											190	1996	Government ratifies NII STDs proposed and developed within industry consorti
											181	1996	Life-long learning on-line required for 40 percent of professional positions
											210	1996	Microsoft fails in new markets
											209	1996	Multiple chip architectures flourish
											197	1996	New infotainment services tailored to specific delivery systems
											206	1996	Tools for searching, catalog, and retrieval of info from distributed data stores
											195	1997	Diverse forms of interactivity proliferate/differentiate new service offerings.
											185	1997	Federal agency administers universal service rules
											207	1997	Many "standards" for PDA communications
											202	1997	Proprietary content copyright protection schemes evolve
											194	1997	Telecommuting extended to include VTC and other electronic meeting technolc
											192	1998	25% of home PCs plugged into CATV systems
											191	1998	Basic ISON service available to 80% of households and 95% of businesses at
											187	1998	Government services/\$ delivered to government provided set tops (welfare, et
											213	1998	Microsoft loses dominance on the desktop
											189	1998	Most new residential comm systems are cap- able of dynamic upstream/downs
											184	1998	Secure personal ID for equipment to prevent theft
											193	1998	Serious interactivity requires desktop systems, don't work for LR TVs.
											179	1999	Content-oriented mutual fund has highest five-year return
											186	2000	Early security problems with commercial transactions on internet resolved

Mapping the Future of ...
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Final Results

Team Votes					Overall Consensus				Team Votes		Overall Consensus																		
A	B	C	D	E	HL	HU	UQ	CM	#	Year	Title	+	=	Must	-	=	Must Not	HL	=	Highly Likely	UQ	=	Unique Event	HU	=	Highly Unlikely	CM	=	Common Event

Summary Statistics

Total Number of Events:	213
Number of Highly Likely Events:	59 (27.7%)
Number Highly Unlikely Events:	10 (4.7%)
Number of Common Events:	13 (6.1%)
Number of Unique Events:	76 (35.7%)

Team Statistics

	Total	Unique	%	Common	%	M+HL	Intersection with HL and HU						
							Consonant			Dissonant			
						%	MN+HU	%	M+HU	%	MN+HL	%	
A	42	16	38%	10	24%	13	31%	2	5%	0	0%	5	12%
B	47	15	32%	12	26%	14	30%	0	0%	0	0%	6	13%
C	45	16	36%	9	20%	20	44%	2	4%	2	4%	2	4%
D	44	20	45%	11	20%	14	32%	0	0%	2	5%	6	14%
E	58	19	33%	12	21%	27	47%	4	7%	0	0%	3	5%

Cross Team Comparison of Voting

Voted the same

		A	B	C	D	E
Voted opposite	A	/	11	9	7	16
	B	3	/	13	10	17
	C	2	2	/	10	15
	D	6	5	4	/	14
	E	4	8	6	9	/

Mapping the Future of ...
The Information Highway:
 The Great Infrastructure Debate

Before and After Rank Order Matrix

Category	Rank Order	Before	After
Defendability	1	E	
	2	B	
	3	D	
	4	A	
	5	C	
Attainability	1	E	E
	2	A	A
	3	B	B
	4	D	D
	5	C	C
Desirability	1	D	D
	2	A	AC
	3	E	AC
	4	C	E
	5	B	B



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After Rank Order Matrix

TEAM	Attainability	Desirability
A	2 51%	2.5 57%
B	3 50%	5 33%
C	5 25%	2.5 57%
D	4 46%	1 63%
E	1 78%	4 40%



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Before Rank Order Matrix

TEAM	Defendability	Attainability	Desirability
A	4 47%	2 53%	2 54%
B	2 53%	3 52%	5 38%
C	5 42%	5 43%	4 49%
D	3 51%	4 48%	1 57%
E	1 57%	1 54%	3 52%

