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가

가

IPv4 가 IPv6

LSN, BcN NGI, Internet2, LSN

II. NGI

1.

NGI(Next Generation Internet; www.ngi.gov)

1996 10

NGI , 21

“21 1998 Bluebook”

[1].

, 2002 10 2.5Gbps , 100

150Mbps , 1997

100 , 10 1,000

, 1996 1,000

NGI

, 가

가

.....

NGI 3가 가 . , , QoS, . , 100 , 100+Mbps~1+Gbps , DREN, NREN, ESNET, vBNS, SuperNet . , , 가 , / [2].

2.

NGI , JET(Joint Engineering Team) LSN(Large Scale Networking) , 가 (National Science and Technology Council: NSTC)

NCO NGI 가 , 가 NCO(National Coordination Office)

NGI (NGI Implementation Team) LSN Working Group NGI , , , NGI , , , 가 , NGI , 가 NGI . JET NGI

1 1 . 1991 , .

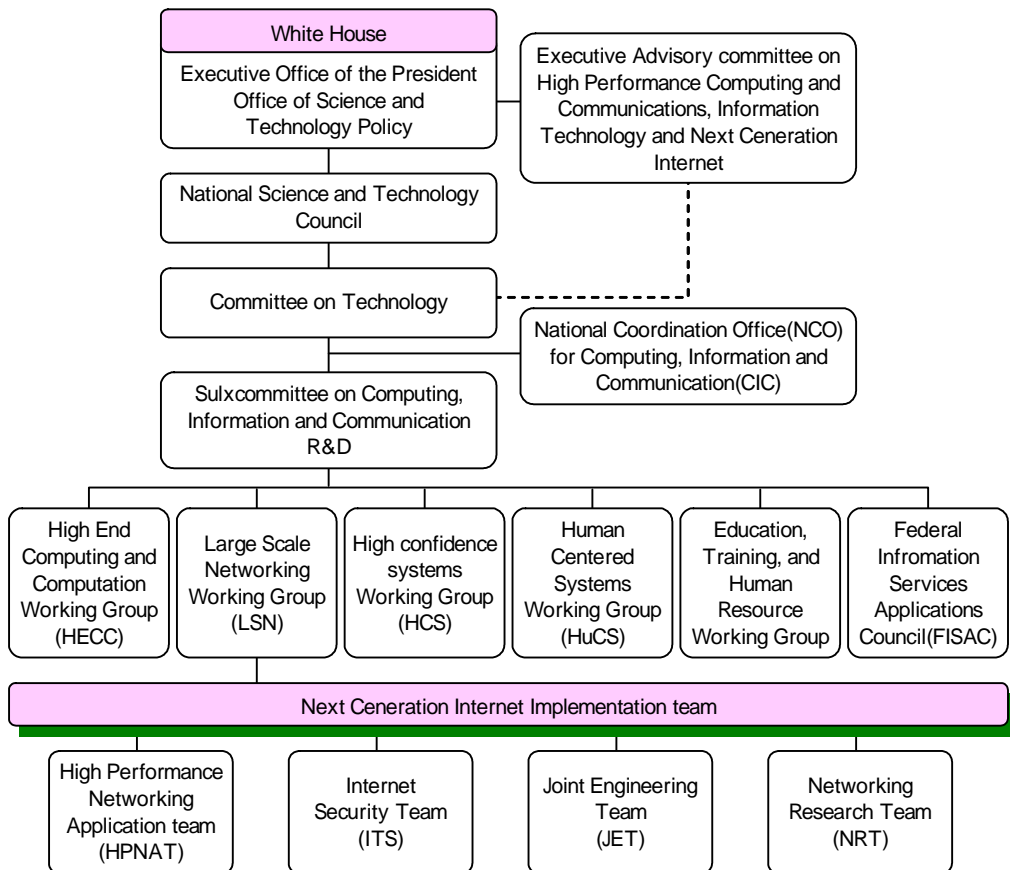
(HPCC Program: High Performance Computing and Communication) . NGI

1998 'Next Generation Internet Research Act of 1998' . 'Next Generation Internet Act of 2001' 2003 [3].

3.

NGI 가

DARPA() , ,
DOE()
ESNet(Energy Science Network)
NASA()
NIST()



< >: www.ngi.gov

(1) NGI

. NLM/NIH

[4].

4.

NGI

vBNS

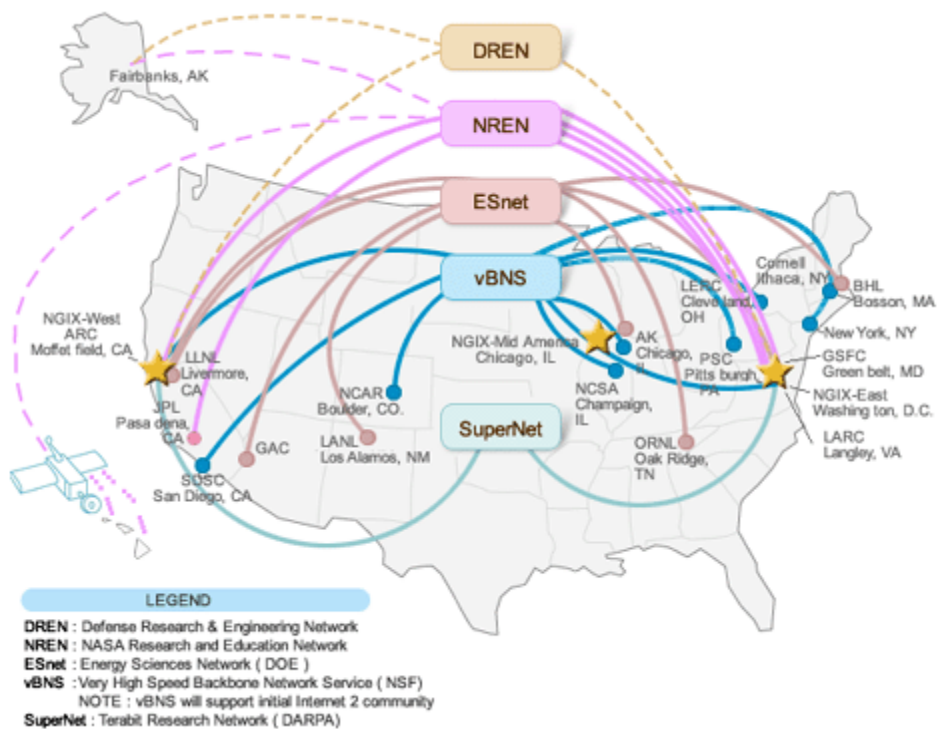
(NSF), ESnet(DoE), NREN(NASA), DREN(DoD), SuperNet(DARPA)

NGIX

NGI

NAP(National Access Point)

가 가 NAP



< >: www.ngi.gov.

(2) NGI

[5].

III. Internet2

1.

Internet2(www.internet2.edu) 140

,
. 1997 9 Abilene
UCAID , UCAID
, 2000 .

Internet2

,
Internet2
. Archive,
, IP , /
, [6].

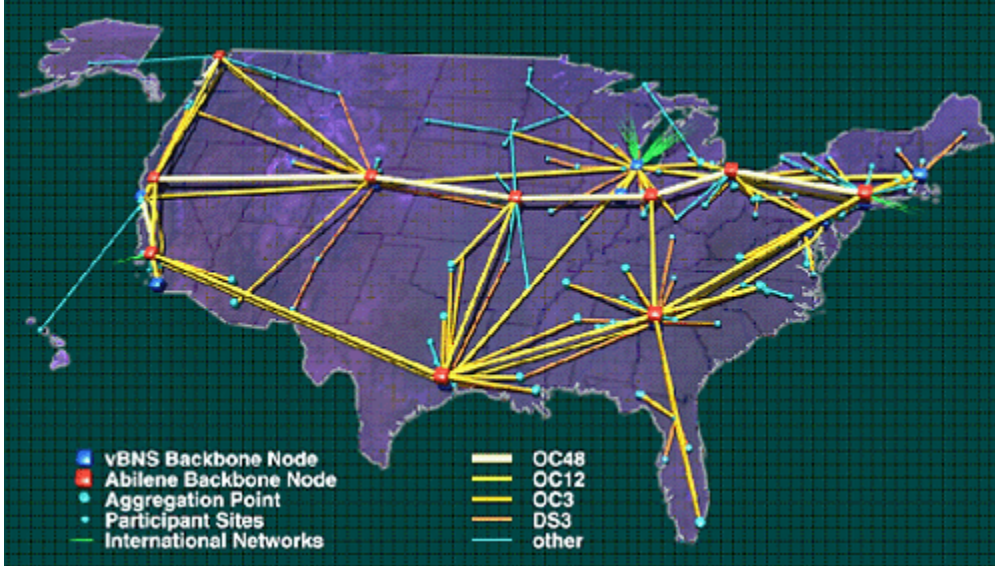
2. Internet

Internet2 (backbone) Abilene, vBNS . vBNS
, 1999 Abilene
vBNS Internet2 ((3)).

3. NGI Internet2

< 1> NGI
. , Internet2
,
NGI . NGI Internet2

[7].



< >: www.internet2.edu

(3) Internet2 - Abilene, vBNS

< 1> NGI Internet2

	NGI	Internet2
	(Agency mission driven)	
	R&D, (Internet2)	GigaPOP Abilene vBNS
		(NGI)

< >: <http://knet.or.kr>

IV. LSN

1.

NGI 2002 (LSN)

LSN(Large Scale Networking, www.itrd.gov)

LSN (Coordinating Group) 2001 3.12.~14. 'New Vision

for Large-Scale Networks: Research and Applications' , 2001 6.25~27. NASA
() Ames Research Center NREN(NASA Research and Education Network)

가
15~20

FY 2002~2006 [8].

2.

LSN 2001 7 HPCC(High Performance Computing and
Communication, NGI(Next Generation Internet), IT²(Information Technology for the 21st
Century) 3가

PITAC 13 가

LSN , , IT

LSN NRT(Networking Research Team:)

DARPA, DOE/SC, NASA, NIST, NSA, NSF . NRT LSN
(Coordinating Group) [9].

LSN AHRQ(Agency for Healthcare Research and Quality),
DARPA(Defense Advanced Research Projects Agency), DISA(Defense Information Systems
Agency), ODDR&E(Department of Defense, Office of the Director, Defense Research &
Engineering), DOE/NNSA(Department of Energy National Nuclear Security Administration),
DOE/SC(Department of Energy Office of Science), EPA(Environmental Protection Agency,
) , NASA(National Aeronautics and Space Administration,) , NIH(National
Institutes of Health,) , NIST(National Institute of Standards and Technology,
) , NOAA(National Oceanic and Atmospheric Administration,) ,
NSA(National Security Agency, 가) , NSF(National Science Foundation,)

13

LSN (wireless), (光: optic), (mobile communication)

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, R&D . LSN
 JET(Joint Engineering Team), MAGIC(Middleware and Grid Infrastructure
 Coordination), NRT(Networking Research Team) 3 .

3. LSN

NSF()
 (Extensible Terascale Facility) ,
 National Middleware Initiative ,
 NIH() (BT) , • , ,
 (re-engineering the clinical research enterprise) . DARPA(Defense Advanced
 Research Projects Agency) Adaptive ,
 NASA() ,
 (high-performance)

NSA(National Security Agency: 가) , optical
 transparency, DWDM, physical-layer transmission impairments, high data-rate signal
 encoding . NIST()
 , ad hoc .
 NOAA() ,

. ODDR&E(Department of Defense, Office of the Director, Defense Research &
 Engineering) Adaptive , scalable optical networking,
 , scalable, peer-to-peer . AHRQ(Agency for Healthcare
 Research and Quality) 1

[10].

4. (HEC R&D: High End Computing Research and Development)

< 2 >

NSF ()	Systems software, middleware, software environments, libraries, visualization, data management, and algorithms for heterogeneous distributed high-end systems
DARPA	High Productivity Computing Systems, polymorphous architectures, networked embedded systems, biocomputational systems, cognitive computing systems)
NASA ()	Simulated autonomous science exploration, collaborative science and engineering technologies, biomolecular probe for disease detection and astronaut health monitoring, Intelligent Vehicle Health Management system, advanced methods to assist in complex, distributed mishap investigation, prototype Concept Design and Risk Tool that identifies, tracks, and trades risks
NIH ()	Bioinformatics; computational biology, tools for determining 3-D molecular structures, visualization and analysis of images from instrumentation data
DOE Office of Science	Scalable mathematical algorithms and software infrastructure(operating systems, component technologies, optimal mathematical solvers) for terascale modeling and simulation applications
DOE/NNSA	Science and engineering innovations in high-speed computation and visualization to enable supercomputer modeling and simulation for U.S. nuclear stockpile stewardship
NSA (가)	Collaborations with high-end systems manufacturers, operating system and programming language improvements, fundamental technologies for special-purpose devices(optical interconnects, power controls, cooling, switches, and design tools), computer memory interconnects performance, fundamental physics of quantum information systems
NOAA	Earth System Modeling Framework; improved climate and weather models via enhanced Modular Ocean Model, Flexible Modeling System, Scalable Modeling System; high-performance scalable systems
NIST	Research in quantum computing, secure quantum communication, optimization and computational geometry, photonics, nanotechnologies, optoelectronics, new chip designs and fabrication methods
ODDR&E	University-based research in novel information processing, including quantum communications and memory

< >: www.hpcc.gov/iwg/lsn.html

5.

< 3 >

Networking and Information Technology Research & Development Particle Physics Data Grid (PPDG)	- 高 (high-bandwidth) , , most data-intensive - NSF() Grid Physics Network PPDG 5- 150
NASA()	- Earth System Modeling Framework and Earth Observing System(EOS) - DOE, NOAA, NSF NASA 가 (寶庫) - , , - DOE/SC, EOS, NOAA, NSF() National Center for Atmospheric Research 가

- NSF()	<ul style="list-style-type: none"> - Geosciences Network(GEON): (geology) , 13 , - Grid Physics Network(GriPhyN): (experimental physics) 가 - Network for Earthquake Engineering Simulation(NEESgrid): (http://www.geongrid.org) - Globus software suite for grid computing: DARPA DOE/SC , DOE/SC Science Grid, NSF() TeraGrid, NASA () Information Power Grid 가 Globus 21 가 * NSF 가 National Virtual Observatory 50 - Global Grid Forum

< >: www.hpcc.gov/iwg/lrn.html

V.

1.

IT

, , ,

2004 18 7,700 2003 16 , 2002 15 6,270 가 .

2004 IT R&D (, 光 , 'trust' ,), (data mining, , 가), (< 4>) [11].

< >

- [1] www.ngi.or.kr
- [2] www.ngi.gov
- [3] http://krnet.or.kr
- [4] www.ngi.gov

< 4> 2004 IT (:)

NSF	218.1 (211.7)	97.9 (76.0)	125.3 (128.8)	103.4 (109.4)	55.0 (53.4)	59.9 (63.8)	74.0 (65.9)	734 (708)
NIH	87.6 (77.1)	41.7 (37.8)	99.0 (93.1)	132.2 (128.8)	9.2 (6.8)	3.7 (3.7)	12.2 (12.1)	386 (359)
NASA	45.9 (35.2)	34.6 (26.0)	67.1 (40.8)	28.9 (12.6)	59.2 (55.8)	24.2 (34.7)	6.7 (4.2)	267 (209)
DAPRA		108.5 (109.8)	78.4 (42.9)	18.2 (17.6)	13.3 (58.6)	4.0 (3.2)		222 (232)
DOE Office of Science	88.9 (98.4)	51.3 (37.3)	16.4 (16.2)	30.0 (28.7)			3.5 (3.5)	190 (184)
NSA		21.3 (51.3)		1.9 (2.1)		28.1 (28.1)		51 (82)
NIST	3.5 (3.5)		6.2 (6.2)	3.2 (3.2)	7.5 (7.5)	2.0 (2.0)		22 (2)
NOAA	13.5 (13.5)	1.8 (1.8)	0.5 (0.5)	2.8 (2.8)	1.5 (1.5)			20 (20)
ODDR&E		(3.6)	(2.0)	(4.7)	(1.0)	(0.7)		(12)
AHRQ			32.0 (6.4)	25.0 (5.2)				57 (12)
EPA	1.6 (1.6)		0.2 (0.2)					2 (2)
	459.1 (441.0)	357.1 (343.6)	425.1 (337.1)	345.5 (314.6)	145.7 (184.6)	122.0 (136.2)	96.4 (85.6)	195.1 (184.3)
DOE/NNSA	41.5 (40.5)	37.3 (37.5)		14.4 (13.5)	32.8 (31.3)		4.4 (4.4)	130 (127)
	500.6 (481.5)	394.4 (381.1)	471.3 (337.1)	373.3 (328.1)	178.5 (215.9)	128.1 (142.3)	100.8 (90.0)	2,147 (1,976)

) 2003
 < >: www.ntia.doc.gov

< 5>

NGI	1998~2002	100~1,000 /	
Internet 2	1998~	180 , . . 2004 4 'Internet2' 1 1,000 km 6.25Gb	()
LSN	2003~	, , IT	HPCC, NGI, IT ² 3가

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- [5] 가 , “APII Testbed ,” , 2003.12., pp.55 - 59.
- [6] www.internet2.edu
- [7] <http://krnet.or.kr>
- [8] www.hpcc.gov/iwg/lsn.html
- [9] www.hpcc.gov/iwg/lsn.html
- [10] www.hpcc.gov/iwg/lsn.html
- [11] www.ntia.doc.gov