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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)							DATE February 2000		
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-wide BA2 Applied Research					R-1 ITEM NOMENCLATURE Next Generation Internet PE 0602110E, R-1 #8				
COST (<i>In Millions</i>)	FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	Cost To Complete	Total Cost
Total Program Element (PE) Cost	41.919	36.473	15.000	0.000	0.000	0.000	0.000	0.000	N/A
Next Generation Internet NGI-01	41.919	36.473	15.000	0.000	0.000	0.000	0.000	0.000	N/A

(U) Mission Description:

(U) The Next Generation Internet (NGI) initiative has three goals: (1) promote experimentation with the next generation of networking technologies; (2) connect universities and national laboratories with high speed networks that are 100 - 1000 times faster than today's Internet; and (3) demonstrate revolutionary applications that meet important national goals and missions. The principal agencies involved in this initiative are DARPA, NSF, NIST, NIH and NASA. These agencies will share in funding this research and development effort. The DARPA activity will be aimed at part of the first two goals. DARPA will demonstrate end-to-end network connectivity at 1+ gigabits-per-second for 10 or more NGI sites. The network technologies to be addressed include multi-gigabit broadband networks, guaranteed quality of service mechanisms, and integrated network management. These technologies will be demonstrated in NGI developed testbed environments for defense-specific applications. Robustness of applications built atop diverse logical and physical infrastructure will be ensured with the development of new software and hardware tools that can automatically track and assess the inter-dependencies of physical layer resources.

(U) Program Accomplishments and Plans:

(U) FY 1999 Accomplishments:

- Gigabit-per-second Network Connectivity. (\$ 27.019 Million)
 - Implemented 10 gigabit-per-second, multi-wave optically switched Wavelength Division Multiplexed (WDM) technology in NGI testbed.
 - Implemented an alpha-level prototype high-speed optical multiplexor and develop specification of Internet Protocol (IP)/WDM protocol structure.
 - Implemented prototype components of network monitoring and management system.

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- Network Management. (\$ 14.900 Million)
 - Defined application program interfaces for information management and collaborative applications.
 - Executed regional partnerships for revolutionary applications.

(U) FY 2000 Plans:

- Gigabit-per-second Network Connectivity. (\$ 17.000 Million)
 - Implement variable rate access technologies and prototype of distributed optical switching capability compatible with 100 Gb/s optical network.
 - Implement streamlined Internet over WDM protocol structure, eliminating two layers of existing telecommunications infrastructure.
- Network Management. (\$ 19.473 Million)
 - Develop network planning and simulation technology to meet requirements for NGI scale networks.
 - Demonstrate real-time (500-msec response) monitoring and control of network resources at all levels.
 - Complete interconnection of Supernet testbed components and software with 2.5 gigabit-per-second access architecture, up to 10 gigabit-per-second backbone, and 100 Gb/s distributed switching capacity.
 - Demonstrate information management and collaborative applications operating over NGI testbed.

(U) FY 2001 Plans:

- Network Architecture and Management for Robust Heterogeneous Gigabit Networks. (\$ 6.900 Million)
 - Develop architectural framework for ensuring maximum end-to-end system survivability.
 - Prototype tool for assessing dependence of applications or networking performance on physical layer resources.
 - Specify robust heterogeneous network architecture that integrates gigabit wireless, wireline and satellite communications.
- Defense Applications of Gigabit Networks. (\$ 8.100 Million)
 - Develop virtual radar console tied to a physical radar and remotely accessible via wide-area network.
 - Demonstrate real-time, high-resolution imagery transfer over multiple streams of multi-gigabyte flows.

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– Enable streaming of raw (undigitized) sensor signal over wide-area links.

(U)	<u>Program Change Summary:</u> <i>(In Millions)</i>	<u>FY1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
	Previous President's Budget	49.504	40.000	0.000
	Current Budget	41.919	36.473	15.000

(U) **Change Summary Explanation:**

FY 1999 Decrease reflects Omnibus and SBIR reprogrammings and \$5.000 Million transfer to OSD HPC Modernization (PE 0603755D) for the partnership between centers program.

FY 2000 Decrease reflects Congressional actions; partially offset by minor reprogramming.

FY 2001 Increase reflects decision to continue program one additional year to ensure orderly transition to private sector support and adequately demonstrate the military utility of NGI-developed technology.

(U) **Other Program Funding Summary Cost:**

- Not Applicable.

(U) **Schedule Profile:**

- Not Applicable.