Report from the Core Networking Panel

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NSF ANIR Principle Investigator Meeting

January 9-10, 2003

(1) Understanding and managing complexity:

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- Complexity in routing.

- Feature interactions.

- Implications of complexity on operations.

- Interactions with scalability and robustness.

(2) Automation:

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- There is a pressing need for reducing required human intervention in the deployment and operations of the network.

- In the case of network management, this includes the management of entire networks, not just the management of individual boxes.

- Issues include failure diagnosis, zero-configuration for internetworking, and policy verification.

- What are the boundaries for self-configuration?

(3) Network resilience:

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- This includes topics such as defensive networks (e.g., DoS prevention, detection and reaction.)

- Issues also include survivability, responding to failures, and improved routing stability, convergence, and failover.

- Interactions of trustworthiness with core networking issues.

(4) Flexibility and evolvability:

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- Overcoming architectural ossification, and understanding evolutionary potentials.

- Flexible in terms of new applications.

- Overlays.

(5) Resource management:

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- Long-term research issues still are pressing in issues of QoS, congestion control, traffic engineering, and other resource managenent mechanisms.

- Congestion control issues include coping with vastly increased variability and dynamic range.

- With QoS in particular, the research issues include economic factors.

Theoretical understanding:

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- One approach that needs continued development, that is not restricted to core networking, is to develop improved theoretical understanding of the network.

- Applying and improving models and metrics.

- Theory for complexity and other issues as well as for performance.

- Fitness for purpose.

- Evaluating degree of optimality.