

# Timothy J. Salo

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## QUALIFICATIONS

- Three decades experience researching, designing, developing, marketing, deploying and operating data communications and Internet technologies, products and networks
- Principal Investigator for AFRL, DARPA, NASA, NOAA, NSF research contracts
- Fifteen years management experience: research, product management, software development

## EXPERIENCE

2000 – **Founder and President, Salo IT Solutions, Inc.**, Minneapolis, MN.  
<<http://www.saloits.com/>>

Research, design, and implement advanced Internet technologies and solutions for demanding network environments, such as wireless ad hoc networks, low-power wireless networks, wireless sensor networks, tactical networks, space networks, hydrologic warning systems and large-scale environmental monitoring networks.

- **Principal Investigator**, *Wide-area Environmental Sensing and alerting networks (WESTnets)*, Funded National Oceanic and Atmospheric Administration (NOAA).
- **Principal Investigator**, *Analysis of Very Narrowband Requirements for Hydrologic Frequencies*. Funded by NOAA.
- **Principal Investigator**, *ALERT-2 Protocol Development*. Funded by NOAA.
- **Principal Investigator**, *An Extensible QoS Framework for Secure Tactical Networks*. Funded by Air Force Research Laboratory (ARFL).

2001 – 2004 **Sr. R&D Engineer, Architecture Technology Corp.**, Eden Prairie, MN.

Created proposals for and oversaw execution of federally funded network research and development projects. Projects included:

- **Architect**, Future Combat Systems (FCS) System of System (SoS) Common Operating Environment (SOSCOE). Under contract to Boeing.
- **Principal Investigator**, *Embedded Transport Agents for Near-Earth Communications*. Funded by NASA Glenn Research Center.

## EXPERIENCE (continued)

- **Principal Investigator**, *Proximity Networks Technology Assessment*. Funded by NASA Glenn Research Center.

1988 – 2000 **Director, Advanced Networking Group, Network Computing Services, Inc.** (formerly Minnesota Supercomputer Center, Inc.), Minneapolis, MN.

Created, acquired external funding for, and managed an Internet research group. Responsible for projects from conception through completion, including:

- **Principal Investigator**, *Real-Time Visualization of IP Flows over Switched WANs*. Funded by DARPA.
- **Principal Investigator**, *MAGIC-II*. Funded by DARPA.
- **Principal Investigator**, *MAGIC Gigabit Testbed*. Funded by DARPA.

1979 – 1988 **Manager, Product Management; Product Manager; Manager, Compiler and Tools Development; Systems Engineer; Senior Systems Programmer, NCR Comten**, St. Paul, MN.

1976 – 1979 **Systems Software Programmer, University of Minnesota**, Minneapolis, MN.

## EDUCATION

- Graduate Student, Computer Science Ph.D. program, University of Minnesota, present
- Masters of Science, Software Engineering, University of St. Thomas, 2002
- Masters of Business Administration, University of Minnesota, 1986
- Bachelor of Science with Distinction, Computer Science, University of Minnesota, 1978

## RESEARCH CONTRACTS AND GRANTS

- **Principal Investigator**, *Wide-area Environmental Sensing and alerting networks (WESTnets)*, National Oceanic and Atmospheric Administration, Contract WC133R11CN0135, September 7, 2011 – March 6, 2012.

Design and develop proof-of-concept implementation of the Wide-area, Environmental Sensing and alerting network (WESTnet) protocols, a next-generation suite of wireless network protocols that will provide enhanced services for hydrologic warning systems and large-scale, wide-area, environmental monitoring networks.

## RESEARCH CONTRACTS AND GRANTS (continued)

- **Principal Investigator**, *Analysis of Very Narrowband Requirements for Hydrologic Frequencies*, National Oceanic and Atmospheric Administration , order DG133W10SE3038, October 1, 2010 – September 30, 2011.

Analyzed the implications for the hydrologic warning system (HWS) community of the future federal very narrowband requirement for radio equipment; conducted field trials to evaluate potentially applicable radio equipment.

- **Principal Investigator**, *ALERT-2 Protocol Development*, National Oceanic and Atmospheric Administration, contract DG133R07CN0175, July 16, 2007 – January 15, 2008.

Design next-generation wireless communication protocols for automated flood-warning systems. <<http://www.alert-2.com/>>

- **Principal Investigator**, *An Extensible QoS Framework for Secure Tactical Networks*, Air Force Research Laboratory, contract FA8750-05-C-0151, April 11, 2005 – January 10, 2006.

Developed an extensible architectural framework, protocol enhancements and other technologies that provide scalable, fine-grained, content-aware, quality-of-service (QoS) assurances and other advanced services in IP networks.

- **Principal Investigator**, *Embedded TCP Agents for Near-Earth Communications*, National Aeronautics and Space Administration, Glenn Research Center, contract NNC04CA52C, January 2004 – July 2004.

Developed extensible, embedded transport agents, which continuously adapt the behavior of the Internet-standard Transmission Control Protocol (TCP) to the unique requirements of near-Earth space communications.

- **Principal Investigator**, *Proximity Networks Technology Assessment*, National Aeronautics and Space Administration, Glenn Research Center, April 1, 2002 - July 30, 2002.

Evaluated maturity of technologies potentially applicable to NASA proximity (e.g., sensor) networks.

- **Principal Investigator**, *Real-Time Visualization of IP Flows over Nontraditional Media*, Defense Advanced Research Projects Agency, contract F30602-98-C-0211, June 1998 - December 2000.

Demonstrated techniques for detailed, global visualization of the state of IP-over-connection-oriented networks such as IP-over-ATM networks. <<http://www.networkvisualization.com/>>

## RESEARCH CONTRACTS AND GRANTS (continued)

- **Principal Investigator**, *MAGIC-II*, Defense Advanced Research Projects Agency, subcontract to contract F19628-95-C-0215, August 1996 - September 1998.

Researched architectures and technologies for integrating high-speed, wide-area ATM networks into large, public IP internets. Also, develop Host ATM Research Platform (HARP) software, a freely available platform for research of IP/ATM networks, which is distributed with the FreeBSD operating system. <<http://www.msci.magic.net/>>

- **Additional Principal Investigator**, *National Virtual Network Access Point*, National Science Foundation, subcontract to cooperative agreement NCR-9321072, July 1994 - June 1998.

Explored architectures for using ATM as a medium for public inter-network interconnections.

- **Principal Investigator**, *Network Research for MAGIC Gigabit Testbed*, Advanced Projects Research Agency, contract F19628-92-C-0072, June 1992 - December 1995.

Conducted network research on integrating high-speed, wide-area, ATM networks into large, public IP internets. Also ensured end-to-end connectivity for the MAGIC Gigabit Testbed at the ATM through TCP/UDP layers by selecting and procuring equipment and providing systems engineering and systems integration services.

- **Principal Investigator**, *Very High-Speed Remote File System*, Advanced Projects Research Agency, contract DAAL03-91-C-0049, September 1991 - September 1992.

Examined issues resulting from connecting very high-speed remote file systems to supercomputers over high-speed, wide-area networks.

- **Principal Investigator**, *New Connections to NSFNET*, National Science Foundation, NCR-9120190, June 1992 - January 1995.

Connected four Minnesota private colleges (College of St. Benedict; Concordia College, St. Paul; Minneapolis College of Art and Design; St. John's University) to the NSFNET.

## PATENTS

Extensible Framework and Method for Fine-Grained, Content-Aware, Quality-of-Service (QoS) Assurances, (pending).

## PUBLICATIONS

Many of these publications are available at: <<http://www.saloits.com/Publications.html>>

## PUBLICATIONS (continued)

- Salo, Timothy J. “Proposed Network-Centric Architecture for the Advanced Communications Package (ACP)”. *Proceedings of the AMSAT-NA 22nd Space Symposium, Atlanta, GA, October 24-26, 2008*. Silver Spring, MD: The Radio Amateur Satellite Corporation. 33-43.
- Salo, Timothy J. “Multi-Factor Fingerprints for Personal Computer Hardware”. *Proceedings of the 2007 Military Communications Conference (MILCOM 2007), Orlando, FL, October 29-31, 2007*. IEEE, 2007.
- Salo, Timothy J. “The DoD Space Test Program: Free Launches for Amateur Satellites”. *Proceedings of the AMSAT-NA 22nd Space Symposium, Arlington, VA, October 8-10, 2004*. Newington, CT: ARRL, 2004. 184-190.
- Salo, Timothy J. “Embedded Transport Agents for Near-Earth Communications”. The Fourth Space Internet Workshop (SIW-4), Baltimore, MD, June 8-10, 2004.
- Salo, Timothy J. “A Proposed Microsat Open Experimental Platform for Amateur Space Communications Research”. *Proceedings of the AMSAT-NA 21st Space Symposium, Toronto, Ontario, October 17-19, 2003*. Newington, CT: ARRL, 2003. 93-103.
- Salo, Timothy J., Barry A. Trent, and Timothy Hartley. *Proximity Networks Technology Assessment*. NASA Contractor Report NASA/CR-2003-212623. NASA Glenn Research Center, October 2003.
- Bonney, Jordan and Timothy J. Salo. *Modeling Report for Ad Hoc Quality of Service in FCS*. Boeing contractor report, March 17, 2002.
- Bonney, Jordan and Timothy J. Salo. *A Study of Network Quality of Service*. Boeing contractor report, March 14, 2002.
- Salo, Timothy J. “Real-Time Visualization of IP Streams Over Switched WANs”. NLANR/Internet-2/CANARIE Techs Workshop, Toronto, Ontario, August 21, 2000.
- Salo, Timothy J. “Real-Time Visualization of IP Streams Over Switched WANs”. North American Network Operators' Group (NANOG), Albuquerque, NM, June 13, 2000.
- Chinoy, Bilal and Timothy J. Salo. “Internet Exchanges: Policy-Driven Evolution”. *Coordinating the Internet*, Brian Kahin and James H. Keller, eds. Cambridge, MA: MIT Press, July 1997.
- Cavanaugh, John D. and Timothy J. Salo. “Internetworking with ATM WANs”. *Advances in Local and Metropolitan Area Networks*, William Stallings, ed. IEEE Computer Society Press, 1994.