

# Dynamic Distributed Overlay Networking of IP Multicast

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## Abstract

Mastering of overlay networking is one of the fundamental challenges in the distributed computing and peer-to-peer arena. While the principle applications of Search and Retrieval have not been intrinsically focused on the communication and transport of data between peers many of the challenges such as network flooding, denial of service that application developers have needed to overcome are related directly to data traffic flow and management.

The IP Internet Protocol is used to create a common overlay network on top of many existing networks using other transport protocols to suite their physical requirements. A technique known as tunneling, where the payload of an IP data packet carries another full IP packet including its header information, is an overlay networking method for creating a VPN Virtual Private Network on top of the existing Internet or IP based network.

VPNs are typically edge-based requiring static real IP addresses at each LAN gateway on the Internet side. Such solutions are cumbersome and inflexible requiring considerable additional infrastructure and reconfiguration of network components. VPNs for the remote user usually involve connection into a hub as a single branch of a network star formation.

A number of protocols are used on the Internet today for different purposes HTTP, HTTPs, SSL, TCP, UDP to name just a few. Tunnels can be created using these protocols to passively enable overlay networking in the IP environment. For example the establishment of an HTTP tunnel can be used to bridge a firewall whereas SSL can be applied where added security is required.

An approach will be presented for generically creating IP Multicast Overlay networks in a fully distributed environment. This brings several advantages: a) Nodes can be dynamically meshed together resulting in load balancing of the network traffic and the creation of a web on top of the web. b) Multicast can now be communicated from any node to any multiple selection of neighboring nodes in an “Any to Many” fashion, rather than the traditional centralized approach of “One to Many”. This is consistent with many of the distributed media-streaming solutions being discussed. c). In a distributed environment overlay networks can be constructed with No Single Point of Failure. This is an important step towards fully fault tolerant distributed software infrastructure. d). The application developer is equipped with a Communications Middleware that permits the establishment of a true VPN without the need to configure additional network infrastructure. e) A turn-key solution for empowering the end-user to establish an overlay network without compromising the network administrator or service provider. The approach realised is applicable to broadband, narrowband, mobile and static environments. Finally some user case studies for applying this technology will be presented.

## Bio

Martin King is one of the leading authorities in Peer-to-Peer technologies and communications. He has extensive international experience in communications technology and the software and hardware industries. Educated in England in microelectronics and electronic engineering, his skills span technology development and implementation, and business development. He holds several patents in the fields of broadcasting, communications and power management circuit design, areas in which he has published numerous articles. He has held various executive management positions with technology companies, and continues to assist several high tech companies as a consultant and board member. Martin King is President and CEO of Quick

Com, the Swiss-based company he founded in 1998, now the rapidly emerging leader in the field of serverless Peer-to-Peer business communications software. Highly reputed for his industry vision in the fields of Peer-to-Peer Computing, telecommunications and broadband media distribution, Martin King is a regular speaker at international conferences.