

WI-FI TECHNOLOGY Innovation

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Course Outline

Making Sense of Wireless



Overview

Wireless Local Area Network (WLAN) technology, commonly referred to as Wi-Fi, has had a dramatic impact on computer networking, and its usage is growing quickly in many new types of applications. In this one day course, Peter Rysavy of Rysavy Research provides a fundamental understanding of how Wi-Fi technology works, how it is being enhanced, how Wi-Fi relates to other wireless technologies such as WiMAX and 3G, and the role the technology will play in the future as part of the emerging mobile broadband fabric. This course has been designed for people developing products and services that use Wi-Fi, as well as people considering the use or expanded use of Wi-Fi technologies in their own organizations.

Unlike other course programs on wireless LANs that are directed at IT managers who must deploy, manage and support the technology, this course is intended for people needing to make fundamental decisions about how to use or respond to the technology, as well as people wanting to understand the capabilities of the technology.

Peter explains in detail the key advantages and disadvantages of wireless local-area technologies compared to wide-area technologies. He examines the capabilities and mechanisms of the IEEE radio-interface standards, including 802.11a, 802.11g and 802.11n. As important are the supporting standards such as IEEE 802.1X and 802.11i for security, 802.11e for quality of service to support voice and video, 802.11k for dynamic measurements, 802.11r for fast roaming and 802.11s for mesh networking. IEEE 802.11n in particular promises to provide a foundation for many new applications due to its extremely high speeds, and the course provides details on the development of this key standard. The session considers future architectures for integrating Wi-Fi with other network technologies, whether WiMAX or 3G. Included are timetables and the implications for new applications and markets.

Voice over WLAN will play an increasingly important role in telephony, and the course presents different approaches, including use in homes and companies, and converged WLAN/cellular solutions based on architectures such as Unlicensed Mobile Access (UMA) and IP Multimedia Subsystem (IMS). Key enabling elements include bandwidth management through traffic prioritization, methods to extend battery life, fast roaming and handovers between different types of networks.

The course takes a hard look at public Wi-Fi deployments, including hotspots and municipal/metro Wi-Fi that use mesh architectures. There are a variety of approaches for making Wi-Fi available over wide areas, and the course presents different vendor solutions. Peter will report on his own personal testing experiences with both hotspot networks and outdoor mesh networks.

Wi-Fi networks do not work in isolation, and part of this course discusses the various strategies for integrating Wi-Fi with enterprise and public networks. Issues include security, management and scalability.

As someone who has been involved at deep technical levels and also in market analysis of wireless technologies since 1990, Peter Rysavy provides unique insights into a complex and rapidly evolving area.

Outline

Wi-Fi Market Overview

- Wireless LAN (WLAN) history
- Market data and projections on WLAN adoption
- Market drivers and inhibitors
- Fundamentals of WLANs compared to wide-area networks

Wi-Fi Applications

- Home networks, enterprise applications, public networks
- Benefits of higher data rates
- Voice-over-IP and multimedia support

Wireless fundamentals

- Basic operations
- Device options for notebooks, PDAs and phones
- Architectures and topologies
- Integration with wired LANs and the Internet
- Spectrum and implications
- Global deployment considerations
- Principles of Orthogonal Frequency Division Multiplexing (OFDM)

IEEE 802.11 Overview

- Architecture
- Protocols
- Distributed Control Function and Point Control Function
- Interframe spacing
- Vendor extensions
- Wireless LAN switching – approaches, benefits

IEEE 802.11 Physical Layer

- Channelization and capacity comparison
- Spectrum and global alignment
- Interference issues
- 5 GHz implications
- 802.11b: Complementary Code Keying
- 802.11a, 802.11g: Orthogonal Frequency Division Multiplexing
- High speeds of 802.11n to 600 Mbps
- Multiple Input Multiple Output (MIMO)
- Standards and backwards compatibility

Related Standards and Specifications

- 802.1X. Port-based network access control
- RADIUS and EAP schemes
- 802.11e. Quality-of-service enhancements
- 802.11f. Multi-Vendor Access Point Interoperability
- 802.11i. Security Enhancements (including WPA, WPA2 and AES)
- 802.11k. Radio resource measurement
- 802.11r. Fast roaming
- 802.11s. Mesh

Voice over WLAN

- Usage scenarios
- Fixed/mobile convergence
- Wi-Fi/cellular convergence
- Architectures and standards
- Power saving methods
- Unlicensed Mobile Access (UMA)
- IP Multimedia Subsystem (IMS)

Wireless Hotspots

- Market trends
- Pros/cons versus 3G, WiMAX
- Business models, free service
- Aggregators versus network operators
- Integration with cellular networks

Municipal/Mesh Wi-Fi

- Global deployments
- Architectural approaches
- Deployment density and coverage
- Competitive position relative to other networks

Integration with Existing Networks

- Security considerations
- Network management
- Scalability
- Subnetting

Conclusions

- Technology evolution
- The future of Wi-Fi
- Market directions
- Open discussion



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Biography

Peter Rysavy is the president of Rysavy Research, a consulting firm that provides clients details and insight into wireless technology. Since 1993, his firm Rysavy Research, has helped clients make wireless technology decisions, understand the capabilities and tradeoffs of different wireless technologies and architectures, and deploy wireless applications. His work includes strategic consultations, training, system design and writing reports and white papers. In the last ten years, Peter has worked for over fifty clients, has taught twenty-five public wireless courses, and has written over fifty articles as well as numerous columns. Peter has evaluated a variety of different wireless technologies, including municipal/mesh Wi-Fi networks, hotspot networks, 3G networks and wireless e-mail systems. Peter has recently published in-depth papers that include "Hard Numbers and Experts' Insights on Migration to Evolved 3G and 4G Wireless Technology" and "EDGE, HSPA and LTE – The Mobile Broadband Advantage."

From 1988 to 1993, Peter was vice-president of engineering and technology at LapLink where projects included LapLink, LapLink Wireless and connectivity solutions for a wide variety of mobile platforms. Prior to that, he spent seven years at Fluke Corporation where he designed communications hardware and software for data acquisition products.

Peter is the executive director of the Portable Computer and Communications Association (PCCA, <http://www.pcca.org>), a group that evaluates wireless technologies, investigates mobile communications architectures and promotes wireless-data interoperability. Peter graduated with BSEE and MSEE degrees from Stanford University in 1979.