Mobile Ad-hoc Networks & Wi-fi & IoT - Navajit Baruah

Wi-Fi (WIFI ALLIANCE-1999)
(802.11 Protocol - 2 Mbps - 1997)


Internet of Things
IEEE P2413, 20014?
Mobile Ad-hoc Networks & Wi-fi & IoT

MANET

Mobile Ad Hoc Networks (MANETs)
A Mobile Ad hoc Network (MANET) is a collection of mobile devices, such as a Rugged Radio (often referred to as "nodes"), that form a self-configuring network. The devices communicate wirelessly by relaying data across the network through a sequence of transmissions. In a true MANET such as Wave Relay® every node can communicate with every other node enabling true peer-to-peer connectivity. This is in marked contrast to the far more common mesh network design, in which a series of stationary access points connect end users only to the Internet.

The Wave Relay® MANET is designed to maintain both peer-to-peer routes and connectivity to an Internet gateway while under mobility. The system detects changes in connectivity and, using a revolutionary routing protocol, elegantly adjusts the pathways in order to maintain the most efficient route between them.
MANET - Types

Vehicular Ad hoc Networks (VANETs)

Smart Phone Ad hoc Networks (SPANs)

Internet based mobile ad hoc networks (iMANETs)

Military / Tactical MANETs
Total Wi-Fi® device shipments to surpass 15 billion by the end of 2016.

More than half of Americans would not want to give up Wi-Fi for a month. The unwillingness to give up Wi-Fi for a month is especially high (70%) among Millennials ages 18-34. – http://www.wi-fi.org/beacon/wi-fi-alliance
IEEE 802.11-1997: The WLAN standard was originally 1 Mbit/s and 2 Mbit/s, 2.4 GHz RF and infrared (IR) standard (1997)
IEEE 802.11a: 54 Mbit/s, 5 GHz standard (1999, shipping products in 2001)
IEEE 802.11b: Enhancements to 802.11 to support 5.5 Mbit/s and 11 Mbit/s (1999)
IEEE 802.11c: Bridge operation procedures; included in the IEEE 802.1D standard (2001)
IEEE 802.11d: International (country-to-country) roaming extensions (2001)
IEEE 802.11e: Enhancements: QoS, including packet bursting (2005)
IEEE 802.11g: 54 Mbit/s, 2.4 GHz standard (backwards compatible with b) (2003)
IEEE 802.11h: Spectrum Managed 802.11a (5 GHz) for European compatibility (2004)
IEEE 802.11k: Radio resource measurement enhancements (2008)
IEEE 802.11l: Higher-throughput improvements using MIMO (multiple-input, multiple-output antennas) (September 2009)
IEEE 802.11n: WAVE—Wireless Access for the Vehicular Environment (such as ambulances and passenger cars) (July 2010)
IEEE 802.11r: Fast BSS transition (FT) (2008)
IEEE 802.11s: Mesh Networking, Extended Service Set (ESS) (July 2011)
IEEE 802.11t: Wireless Performance Prediction (WPP) — test methods and metrics Recommendation cancelled
IEEE 802.11u: Improvements related to HotSpots and 3rd-party authorization of clients, e.g., cellular network offload (February 2011)
IEEE 802.11v: Wireless network management (February 2011)
IEEE 802.11w: Protected Management Frames (September 2009)
IEEE 802.11z: Extensions to Direct Link Setup (DLS) (September 2010)
IEEE 802.11-2012: A new release of the standard that includes amendments a, b, d, e, g, h, i, and j. (July 2007)
IEEE 802.11aa: Robust streaming of Audio Video Transport Streams (June 2012)
IEEE 802.11ac: Very High Throughput >6 GHz [48] potential improvements over 802.11n: better modulation scheme (expected ~10% throughput increase), wider channels (estimate in future time 80 to 160 MHz), multi user MIMO; (December 2013)
IEEE 802.11ad: Very High Throughput 60 GHz (December 2012) — see WiGig
IEEE 802.11ae: Prioritization of Management Frames (March 2012)
IEEE 802.11af: TV Whitestope (February 2014)
Wi-Fi

In process

IEEE 802.11mc: Roll-up of 802.11-2012 with the aa, ac, ad, ae & af amendments to be published as 802.11-2016 (~ March 2016)

IEEE 802.11ah: Sub 1 GHz license exempt operation (e.g., sensor network, smart metering) (~ March 2016)

IEEE 802.11ai: Fast Initial Link Setup (~ November 2015)

IEEE 802.11aj: China Millimeter Wave (~ June 2016)

IEEE 802.11ak: General Links (~ May 2016)

IEEE 802.11aq: Pre-association Discovery (~ July 2016)

IEEE 802.11ax: High Efficiency WLAN (~ May 2018)

IEEE 802.11ay: Enhancements for Ultra High Throughput in and around the 60 GHz Band (~ TBD)

IEEE 802.11az: Next Generation Positioning (~ TBD)
Wi-Fi standards in a Nut-shell

IEEE 802.11-1997: The WLAN standard was originally 1 Mbit/s and 2 Mbit/s, 2.4 GHz RF and infrared (IR) standard (1997)

IEEE 802.11a: 54 Mbit/s, 5 GHz standard (1999, shipping products in 2001)

IEEE 802.11b: Enhancements to 802.11 to support 5.5 Mbit/s and 11 Mbit/s, 2.4 GHz (1999)


IEEE 802.11g: 54 Mbit/s, 2.4 GHz standard (backwards compatible with b) (2003)

IEEE 802.11n: 600 Mbit/s Us

IEEE 802.11ac: 1300 Mbit/s

Next is

IEEE 802.11ad: 4600 Mbit/s Very High Throughput 60 GHz (December 2012) — WiGig

IEEE 802.11af: 54 – 790 MHz TV Whitespace

IEEE 802.11ah: 900 MHz Sensor network
Wi-Fi

Wi-Fi Entering newer frequency ranges
Internet of Things (IoT)

Things will get more complex as different technologies and domains mix and converge
Wi-Fi was initially used as Ad-Hoc Mobile wireless network in the 1990s to quickly share internet connection in conference rooms.

Ad-Hoc Mode went into oblivion for a long time till its emergence as Wi-Fi Direct. Which is not Ad-Hoc in real sense.

With future IoT applications demanding Ad-Hoc Modes Wi-Fi is most well suited.

In fact Wi-Fi have the promise of being the vehicle for IoT.
References and Further Reading

MANET
https://en.wikipedia.org/wiki/AmbientTalk
http://www.antd.nist.gov/wahn_mahn.shtml

Wi-Fi
https://getvoip.com/history-of-wifi/
http://www.wi-fi.org/
https://youtu.be/OO8Ggh5y94Y (Qualcomm 802.11ad)

IOT
http://iot.ieee.org/
http://postscapes.com/companies/technologies/communication/iot-wifi-companies?limit=12
http://standards.ieee.org/innovate/iot
http://grouper.ieee.org/groups/2413

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Thanks You

Open for Questions Offline