

WiSe-Zeroconf

an OS independent ZeroConf standard networking protocols

Faster Time to Market with lesser costs:

embWiSe, an acronym of 'Embedded Wireless Systems Engineering', provides complete embedded WiFi driver software and security supplicant framework leveraging expertise in WiFi, interconnect technologies like SDIO, SPI, PCI / PCIe and USB, embedded OS and SoC platforms. embWiSe is well placed to provide its hybrid software products/services solutions, that enable WiFi connectivity in connected device designs on any processor, OS and WiFi chipsets, **faster and at a lesser costs.**

As networked devices become smaller, more portable, and more adhoc, the ability to operate with lesser or no configured infrastructure is increasingly important. In particular features like, the ability of an IP enabled device to automatically allocate IP address for itself when no IP address is present, looking up DNS Resource record data types in the absence of a conventional managed DNS server, are becoming essential.

Zeroconf, based on the original implementation from Apple's Bonjour (aka Rendezvous) is a set of standards that were mooted keeping the above requirements in mind. **The main objectives of the Zeroconf standard are:**

- Little or no administration or configuration to set up the network devices (User Friendliness)
- To make network devices work when no infrastructure is present, or having it is not feasible
- To reduce the impact of infrastructure failures

The following are the important protocol standards drafted by Zeroconf IETF (<http://www.zeroconf.org>):

- Dynamic Configuration of IPv4 Link-Local Addresses
- Multicast DNS
- DNS-Based Service Discovery

embWiSe Technologies, with its vast experience and expertise on embedded and 802.11x technologies has implemented a Zeroconf stack (WiSe-Zeroconf) for the Embedded Devices/Systems, like Printers, Consumer Electronics devices, 802.11x WirelessLAN Access Devices, etc. The WiSe-Zeroconf is an OS independent ZeroConf

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Wise-Zeroconf

standard networking protocols for embedded devices for delivering hassle-free ad-hoc networking, Device / service discovery and IP configuration.

Branded as Bonjour (aka Rendezvous) by Apple Computer, Inc., and conforming to standards as laid down by IETF Zeroconf Working Group, the WiSe-Zeroconf provides the ease of use, enjoyed by users of desktops particularly Mac OS X. WiSe-Zeroconf allows embedded device developers to easily embed Zeroconf functionality in their applications, thereby facilitating the novice users to avoid handling network configuration tasks.

The highlights of this implementation are:

- Adhering to the draft standards laid down by the IETF Zeroconf Working Group
- OS independent
- Highly portable to any embedded Operating System platform
- Optimal Memory & CPU resource requirements

Currently the WiSe-Zeroconf is supported on Linux, ThreadX RTOS and FreeRTOS in addition to an OS-less version to address small memory footprint requirements.

The features and functionalities of the various protocols/modules of WiSe-Zeroconf are enumerated as under:

1. WiSe-Zeroconf is a ground-up development with minimal foot-print (less than 30KB in whole) and judicious use of memory.
2. WiSe-Zeroconf has an Auto-IP implementation follows the 'Dynamic Configuration of IPv4 Link Local Addresses' Draft completely. This provides a 169.254 IP address selection based on MAC and supports the Probing / Collision Detection / Defending and Reconfiguration phases as laid down in the standards.
3. A complete solution with all the three ZeroConf requirements (Auto-IP, Multicast DNS and Service Discovery) implemented as per the standards.
4. Configurable records through APIs (for embedded systems) and / or Configuration files.

Dynamic Configuration of IPv4 Link-Local Addresses

To participate in wide-area IP networking, a host needs to be configured with IP addresses for its interfaces, either manually by the user or automatically from a source on the network such as a DHCP server. Unfortunately, such address configuration information may not always be available - failure of the DHCP server, lack of awareness on the part of the user to manually configure IP address, embedded devices with limited input mechanisms.

The IPv4 Link-Local Address standard specifies a method by which a host may automatically configure an interface with an IPv4 address within the 169.254/16 prefix that is valid for communication with other devices connected to the same physical (or logical) link.

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IPv4 Link-Local addresses are not suitable for communication with devices not directly connected to the same physical (or logical) link, and are only used where stable, routable addresses are not available.

Features:

- Dynamic allocation of IPv4 Link local address in 169.254/16 subnet
- IPv4 Address unique in local link
- This IPv4 address used only when no other IP address is available
- Communication limited to local link
- Highly Suitable for adhoc networks where having a DHCP server is not possible
- Compatible to similar feature currently available in Microsoft Windows & Apple Mac PCs.

Multicast DNS

Multicast DNS (mDNS) in WiSe-Zeroconf provides the ability to do DNS-like operations on the local link in the absence of any conventional unicast DNS server. In addition, mDNS designates a portion of the DNS namespace (.local.) free for local use, without the need to pay any annual fee, and without the need to set up delegations or otherwise configure a conventional DNS server to answer for those names.

Features:

- Compatible with Standard DNS
- Less impact on network devices when DNS server goes down
- Suitable for adhoc networks where no DNS infrastructure is available

DNS-Based Service Discovery

The DNS-based Service Discovery in WiSe-Zeroconf is a method by which user can discover the services that are present in the local network. It describes a convention for naming and structuring DNS resource records. Given a type of service that a client is looking for, and a domain in which the client is looking for that service, this convention allows clients to discover a list of named instances of that desired service, using only standard DNS queries. In short, this is referred to as DNS-based Service Discovery, or DNS-SD.

For example, the user can search for the list of network printers available in the local LAN. The features of the printers (like number of colors supported, resolution etc) can also be made known to the user using this mechanism. The user can browse the network for a subset of printers that supports the features specified by him.

Features:

- Uses Standard DNS protocol
- No necessity of a Central aggregation server
- Highly Suitable for adhoc networks



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embWiSe also offers value-added services to the WiSe-Zeroconf stack porting to an OS platform, integrating with an existing firmware in an embedded device, customization, etc.,

Licensing:

WiSe-Zeroconf is supplied as a portable source code package under different license terms including royalty-free license option.

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