Wired-Wireless Bridging

Proposal for PAR and 5 Criteria for 802.1

Version 4

Norman Finn

Cisco Systems

Project Authorization Request

Title

- PAR for an amendment to an existing Standard 802.1Q-2011
- P802.1Qbw (or Qbx, etc., as appropriate)
- IEEE Standard for Local and Metropolitan Area Networks---Virtual Bridged Local Area Networks - Amendment: Enhancements to Bridging of 802.11 Media

Scope

- This standard specifies protocols, procedures, and managed objects to allow 802.11 media to provide internal connections within bridged networks, as well as access to bridged networks.

Need

- There are a large number of new products, including home entertainment systems and industrial control equipment, that have both an IEEE 802.11 wireless station capability and a wired IEEE 802.3 Ethernet capability. IEEE 802.11 has initiated work on 802.11 media operating in the Gbit/sec range. These developments raise a demand for supporting IEEE 802.11 media to the same level as other media supported by bridges, as a medium internal to the network, as well as a medium offering access to the network.

Stakeholders

- Vendors, users, administrators, designers, customers, and owners of mixed wireless and wired IEEE 802 networks.

Project completion dependencies

- This standard will require features to be standardized in a parallel IEEE 802.11 project. The two Working Groups will cooperate to produce these standards.

Other standards with a similar scope

- The IEEE 802.11s Mesh Network standards attempts to address a part of this need. However, it defines only the wireless portion of a network. A mixed network of wired and wireless connections suffers in this model because a) the wired and wireless portions of the network are opaque to each other; and b) the frequent improvements made in 802.1 bridged networks are unavailable to the wireless portions of the whole.

Five Criteria

Broad Market Potential

A standards project authorized by IEEE 802 shall have a broad market potential. Specifically, it shall have the potential for:

- Broad sets of applicability.

  Home entertainment devices are acquiring wired and wireless interfaces. The ability to build a plug-and-play bridged network using arbitrary connections would accelerate the acceptance of Ethernet plus Wi-Fi as the primary means of transmitting video and audio signals. Other networks have similar requirements for arbitrary wired and wireless connectivity.

- Multiple vendors and numerous users.

  A great many vendors offer devices with both wired and wireless capability.

- Balanced costs (LAN versus attached stations).

  This project reduces the cost of ownership of devices with wired and wireless connectivity by reducing the overall network complexity in the absence of a bridging solution.

Compatibility

- IEEE 802 LMSC defines a family of standards. All standards should be in conformance : IEEE Std 802, IEEE 802.1D, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 Working Group. In order to demonstrate compatibility with this criterion, the Five Criteria statement must answer the following questions.

  a. Does the PAR mandate that the standard shall comply with IEEE Std 802, IEEE Std 802.1D and IEEE Std 802.1Q?

  This PAR is for an amendment to 802.1Q, which defines bridging, and will be internally consistent.

  b. If not, how will the Working Group ensure that the resulting draft standard is compliant, or if not, receives appropriate review from the IEEE 802.1 Working Group?

  Not applicable.

Distinct Identity

Each IEEE 802 standard shall have a distinct identity. To achieve this, each authorized project shall be:

- Substantially different from other IEEE 802 standards.

  There is no IEEE 802 standard that provides this capability.

- One unique solution per problem (not two solutions to a problem).

  There is no standard outside IEEE 802 that provides this capability.

- Easy for the document reader to select the relevant specification.

  This project will amend the only IEEE 802 standard defining bridges.

Technical Feasibility

For a project to be authorized, it shall be able to show its technical feasibility. At a minimum, the proposed project shall show:

- Demonstrated system feasibility.

  Multiple vendors have implemented similar proprietary solutions.

- Proven technology, reasonable testing.

  IEEE 802.1Q and IEEE 802.11 are widely implemented and successful in the market.

- Confidence in reliability.

  Bridging will not reduce the well-known and accepted reliability if 802.11 media.

- Coexistence of IEEE 802 LMSC wireless standards specifying devices for unlicensed operation.

  Not applicable.

Economic Feasibility

For a project to be authorized, it shall be able to show economic feasibility (so far as can reasonably be estimated) for its intended applications. At a minimum, the proposed project shall show:

- Known cost factors, reliable data.

  This project introduces no hardware costs beyond the minimal and well-known resources consumed by an additional software protocol whose requirements are firmly bounded.

- Reasonable cost for performance.

  The cost of upgrading software and configuring the protocol is reasonable, given the improvement in connectivity and forwarding efficiency gained.

- Consideration of installation costs.

  The cost of installing enhanced software, in exchange for improved network performance, is familiar to vendors and users of bridged networks.