Five Criteria – P802.1Qbg – Edge Virtual Bridging

1. **Broad Market Potential**
    a. **Broad sets of applicability**
    The use of virtual stations is common in data centers and server environments and is gaining popularity in client computing as well. As a result vast numbers of virtual stations are deployed adjacent to bridges with advanced services that may be offered to these virtual stations. A reflective relay service in the adjacent bridge makes this possible and may also be beneficial to other environments such as wireless access points.
    b. **Multiple vendors and numerous users**
    Multiple software and hardware vendors have expressed interest in the proposed project and have participated in an ad-hoc public forum in order to create this project authorization request.
    In addition, multiple vendors have announced products supporting similar technologies in a proprietary way.
    c. **Balanced costs (LAN versus attached stations)**
    The introduction of this standard is specifically intended to keep the balance of costs between bridge and station components consistent with current costs by allowing virtual station hosts to exploit the enhanced bridging capabilities of the adjacent bridges without requiring them to incur the additional costs associated with those capabilities.

2. **Compatibility**
    The proposed standard will be an amendment to 802.1Q, and will interoperate and coexist with all prior revisions and amendments of the 802.1Q standard. No new changes to the frame format are required. Moderate changes to existing 802.1Q frame relay are required to allow for reflective relay and discovery of this new capability will be included to assure loop free operation is achieved. This technology will assume full benefit of other Data Center Bridging technologies under development including Priority-based flow control, Enhanced Transmission Selection, and Congestion Notification.

3. **Distinct Identity**
    a. **Substantially different from other IEEE 802 standards**
    No other standard addresses providing reflective relay to enable multiple virtual stations to share the relay and other services of an adjacent bridge.
    b. **One unique solution per problem (not two solutions to a problem)**
    The proposed standard is the only proposed standard for defining and managing reflective relay and remote ports extended to an

adjacent port aggregation service. Importantly, this proposal addresses the needs produced by bridges extending their services to virtual stations with a common solution thereby eliminating the need for an additional solution in the future.

c. **Easy for the document reader to select the relevant specification**
IEEE Std. 802.1Q is the natural reference for connection of any station (including virtual stations) to an 802.1 bridged environment, which will make the capabilities defined by this amendment easy to locate. The amendment will clearly state where its use is appropriate.

4. **Technical Feasibility**
   a. **Demonstrated system feasibility**
   Similar techniques (e.g. station embedded bridges) are being deployed as proprietary enhancements to virtual server environments and as enhancements to multi-function NICs. The proposal is a natural extension of capabilities already provided in these environments.
   The reflective relay capability has been successfully demonstrated using existing switch chips and minor software code changes to the Linux® Open Source bridge module.
   b. **Proven technology, reasonable testing**
   This technology has been proven on an operational basis in data centers using proprietary implementations and prototype software implementations. These techniques are used in operational environments and have been shown to be reasonably testable
   c. **Confidence in reliability**
   These and similar techniques have been proven reliable in real-world deployments of virtual machine hypervisors and station embedded bridges.
   d. **Coexistence of 802 wireless standards specifying devices for unlicensed operation**
   Not applicable.

5. **Economic Feasibility**
   a. **Known cost factors, reliable data**
   The proposed amendment will not materially change the cost structure of hypervisor software, NICs with embedded bridging support, and 802.1Q bridges as it requires no additional hardware structures and minimal software changes.
   b. **Reasonable cost for performance**
   The proposed technology reduces the overall cost of extending adjacent bridge services to virtual stations while also allowing for configurations where virtual stations may choose higher performance relay services from embedded virtual bridges.

c. Consideration of installation costs

The cost of installing and configuring virtual station bridging is expected to be reduced by allowing for consistent management of bridge services extended to virtual stations and to physical stations.