IEEE P802.15
Wireless Personal Area Networks

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)		
Title	**SG VLC Project Draft 5C**		
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Abstract	[Since May 2008, SG VLC has investigated and studied the market requirements, industry needs, and technology feasibility. This document contains the supporting 5 criteria.]		
Purpose	[This document is supporting the submission of the PAR to the P802.15 Working Group]		
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1. BROAD MARKET POTENTIAL

a) Broad sets of applicability

There is a world-wide growing interest in visible-light communication (VLC).

VLC applications may be classified depending on whether they use existing visible-light infrastructures or not. An example for such an infrastructure is room illumination.
Examples of infrastructure-based applications include indoor location-based services (LBS); secure point-to-multipoint communication (office, hospital, air plane); intelligent transportation systems (ITS); information broadcast, etc.
An example of infrastructure-independent applications is a secure point-to-point communication between two handheld devices.
Examples of potential VLC devices include cellular phones, portable multimedia players (PMPs), personal digital assistants (PDAs), navigation, visible-light access point (AP), signboards, billboards, traffic signals, in-vehicle illumination, street lamps, and visible-light IDs.

With an effective wireless standard for this class of applications, the VLC market potential is huge.

b) Multiple vendors and numerous users

The various institutions and companies participating in the IEEE 802.15 VLC study group demonstrate the broad interest in the utilization of visible-light communication technologies. Participating members in the study group include international wireless industry, academic researchers, system integrators, consumer electronics companies, and potential end users.

c) Balanced costs (LAN versus attached stations)

The proposed project will be developed with the aim that the connectivity costs will be a reasonably small fraction of the cost of the target devices such as sensors, tags, human-interface devices, etc

2. COMPATIBILITY

IEEE 802 defines a family of standards. All standards shall be in conformance with IEEE 802.1 Architecture, Management and Interworking. All logical-link-control (LLC) and media-access (MAC) standards shall be compatible with ISO 10039, MAC Service Definition 1, at the LLC/MAC boundary. Within the LLC Working Group there shall be one LLC standard, including one or more LLC protocols with a common LLC/MAC interface. Within a MAC Working Group there shall be one MAC standard and one or more Physical Layer standards with a common MAC/Physical layer interface. Each standard in the IEEE 802 family of standards shall include a definition of managed objects, which are compatible with OSI systems management standards.

Note: This requirement is subject to final resolution of corrections and revision to current ISO 10039, currently inconsistent with ISO 8802 series standards.

The MAC layer of visible-light communication (VLC) Standard will be compatible with the IEEE 802 requirements for architecture, management, and inter-networking, as needed.

3. DISTINCT IDENTITY

a) Substantially different from other IEEE 802 standards.
This project will be distinguishable from the other IEEE 802 standards due to its unique spectral band from 380 to 780 nm in wavelength and the fact that it is physical media independent, i.e. “wireless”. The visibility of the band also allows communication that can be perceived by the user (light!). We are unaware of any standards that address free space communication in the aforementioned wavelength range.

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

The proposed standard will address a unique solution for visible-light communications in free space. The standard will provide short-range communication using the visible band and target various applications such as secure point-to-point communication; indoor location-based services (LBS); secure point-to-multipoint communication (office, hospital, air plane); intelligent transportation systems (ITS); information broadcast, etc.

c) Easy for the document reader to select the relevant specification.
The proposed VLC Standard will be a distinct document with clearly distinguishable specifications.

4. TECHNICAL FEASIBILITY

a) Demonstrated system feasibility
There have been sufficient test results, demonstrations, and simulations verifying that VLC implementations are feasible.

b) Proven technology, reasonable testing
The components used for VLC are widely used in illumination and other applications and are produced in large volumes, showing that the technologies required are proven. Fabrication and testing techniques are used for volume manufacture of optoelectronic components, showing that the testing required is reasonable.

c) Confidence in reliability
The air interface protocol will be designed to meet commercial reliability standards. Previously demonstrated prototypes provide confidence in the reliability of the proposed project.

A coexistence assurance document is not required as a Standard using visible light as the communications medium is inherently non-interfering with other IEEE wireless standards.

5. ECONOMIC FEASIBILITY

a) Known cost factors, reliable data
High-volume applications using VLC devices in components like mobile phones or illumination lamps will enable a low-cost source of components. Development efforts for VLC will ensure a cost that is consistent with reasonable business strategy.

b) Reasonable cost for performance
Based on test results and prototypes, the estimates meet expected size, cost, and power requirements.

c) Consideration of installation costs
One of the project objectives includes low-cost installation with minimal to no operator intervention.