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*ISO/IEC JTC 1 SC 25/WG 1 (Home Electronic System, HES)***THE WG 1 “ROADMAP,” 2007 EDITION****Timothy Schoechele, PhD – Editor****Introduction**

This “roadmap” clarifies the history, mission and scope of WG 1 for the benefit and understanding of experts joining WG 1 and for readers of the documents and standards issued. It begins by tracing the context and evolution of the committee’s work program. This should enable the reader to understand the present focus of WG 1 on the interoperability of products and services.

Working Group 1 (WG 1) of Joint Technical Committee 1 (JTC 1), Subcommittee 25 (SC 25—Interconnection of Information Technology Equipment) is the international standards body devoted to the interconnection of home electrical and electronic equipment and products. Electronic products and services play a growing role in the lives of consumers and in their homes. This is particularly true with the rapid expansion of the Internet and broadband delivery of services such as entertainment, information, education, healthcare, energy management, and the like. With this proliferation of products and services, there is an increasing potential for incompatibility and lack of interoperability, potentially resulting in problems of safety, security, privacy, and consumer confusion and dissatisfaction. Ultimately, these problems could limit market growth.

In the interests of consumers and of industry, and to foster international trade and commerce, WG 1 has set out to establish voluntary industry standards. These standards benefit consumers and encourage market growth by enabling compatibility and interoperability among home products and systems. Specifically, WG 1 seeks to establish an interoperability platform supporting the growth of such products and systems, without limiting technical innovation or market competitiveness.

Home Electronic System (HES): definition and mission

The Home Electronic System is a network of networks, operating within the home and providing external access that enables an environment for compatible and interoperable consumer products. The mission of WG 1 is to develop standards for a Home Electronic System that unifies or allows home electronic products (devices, networks, services, *etc.*) to interoperate or to operate, where feasible, as a single coherent system in a manner that benefits all stakeholders including industry and consumers.

A brief history of WG 1

The historical evolution of the WG 1 work program reflects the historical migration of industry. WG 1 was originally created in 1983 as part of the IEC (International Electrotechnical Commission) TC 83 — Interconnection of Information Technology Equipment. When JTC1, the joint ISO and IEC committee for Information Technology, was formed in 1988, TC 83 eventually became SC 25 under the newly reorganized structure. This restructuring was brought about because of the increasing overlap between electrical equipment (IEC) and non-electrical systems (ISO) standardization in the field of Information Technology.¹ Originally, the mission of WG 1 was the standardization of a universal “Home Electronic System.” It is interesting to note that the term “system” was used in the singular rather than the plural—emphasizing the desire to establish a single standardized electronic system for the home. At that time the work was focused on HES, class 1, which was defined as focused primarily on monitoring and control applications, a topic generally known as “home automation.” Higher bandwidth applications HES 2 and HES 3, Broadband and multimedia applications, were foreseen for a future when the specification of home automation was finished. Home automation has now been absorbed under the collective terms: “home networking” and “home systems.”

The Secretariat of WG 1 continues to be held by the United States where it was delegated to the EIA (Electronic Industries Association), later becoming the CEA (Consumer Electronics Association). WG 1 participants have included experts accredited by various national standards bodies and representing government agencies, industrial associations, telephone operating firms and manufacturers, consumer electronics manufacturers, home appliance and fixture manufacturers, energy utilities, universities, and various independent consultants. After

2000, the WG 1 Secretariat responsibility migrated from the CEA to its sister organization, the TIA (Telecommunications Industry Association), where it resides today.

Technical scope of WG 1

In its early years, WG 1 had the ambition of establishing a single standardized network protocol and application language for the home. By the early 1990s this vision had become tempered by the realities of the marketplace and industrial politics. National and regional standards and technologies began to proliferate—with multiple OSIⁱⁱ lower-layer signaling schemes and protocols emerging in Japan, North America, and Europe. Each industrial sector also embraced applications that served their own markets and, in some cases, served as barriers to market entry by those outside that industrial sector. Specialized industry consortia began to emerge and to play an increasing role in the informal standardization and market promotion of lower layer protocols and technologies. Such consortia could often effectively marshal resources and serve important functions (*e.g.*, marketing, branding, promotion, licensing, certification, *etc.*) that formal standards bodies such as WG 1 were not prepared for or interested in providing.

As these changes in the nature of standardization took place, WG 1 shifted its focus away from physical networks, and it set a goal for standardizing the Universal Interface (UI), a middle layer product interface (hardware and command set). The intent was to isolate the user from regional, national, and industry-specific solutions. The burden of adapting to particular installed networks was to be the responsibility of the network providers, thus allowing consumer electronics manufacturers to build products that worked worldwide. WG 1 then focused subsequent efforts on upper layer protocols and applications, and on issues such as system architecture, safety, security and privacy.

The UI was standardized by WG 1 in the mid-1990s and has since been incorporated into some products. But, further technological developments, including a proliferation of new wired and wireless products, and application (upper) layer protocols began to establish additional compatibility challenges and new requirements for WG 1. Rather than pursue further work on any specific network or a universal application language, WG 1 decided to focus on developing a general architectural model for home systems (TR 14543 series) and applications models (TR 15067 series). WG 1 is now using these documents as the basis for its current work.

A new vision

At the close of the 1990s, WG 1 began to realize a new vision. This new vision became possible with the emergence of the Internet. The Internet began to drive demand for broadband access technologies (*e.g.*, cable, satellite, DSL, *etc.*) that brought new value to home networks by connecting the home to the outside world more economically and effectively than previously practicable. Such connection to the outside world, while it created opportunity, also entailed risk of incompatibility and loss of interoperability as technology and products continued to advance. WG 1 recognized that such risk could best be controlled by a single, standardized and managed interconnecting “platform” technology—a concept called the *residential gateway*.ⁱⁱⁱ

It then became obvious that translation from access networks to home networks, or between dissimilar home networks, to achieve system interoperability, could only take place above the application layer. It also became clear that, while some had ambitions to become the “one and only” global command and control language, there were and would continue to remain, differing languages adapted for different purposes and different regions of the world—and that, over time, these would probably increase.

WG 1 began to recognize that it could, however, apply the knowledge accumulated from years of studying home applications—not to create a universal application layer protocol and language—but to create a way of translating among all these (present and future) command and control protocols and languages. The residential gateway, since it formed the point of common connection between these various networks, was the best location for this translation. At the same time, it was also recognized that the residential gateway would not necessarily be confined to a single “box,” but might be implemented in a distributed manner—perhaps even partially incorporated into various consumer electronic products.

In 1998, WG 1 initiated the Residential Gateway project, and by 2001, WG 1 began the Interoperability project to establish a linguistic framework within which the gateway could be built. Initial standards for the gateway and interoperability were adopted and published in 2004, and further work on both of these is progressing.

Future work

The future work program of WG 1 is expected to focus on the development of system-level standards that support all the applications envisaged for the home. Primarily, these will be focused on the topics of multi-vendor systems, interoperability, the residential gateway, safety, security, and energy management. Proposed new work items will be considered in relation to their relevance to these primary topics. It is expected that the convergence of control, voice, video, and data services in the home will play an increasing role in the future, and that emerging consumer issues such as safety, security, and privacy will be important topics. Despite the fact that many projects in WG 1 have the main emphasis on the applications, It is expected that WG 1 will consider standardizing at all protocol layers. One of the ways WG 1 plans to achieve this is to specify “standardized profiles” and implementation examples as parts of WG 1 projects. Furthermore, WG 1 will likely seek to coordinate and to collaborate with other bodies (both formal and informal) specializing in such areas, in order to complement and to incorporate much competent work being done by others. For example, in recent years WG 1 has held co-located meetings, exchanged documents, and shared participants with JTC 1/SC 6 (Telecommunications and the Exchange of Information Between Systems) in areas that significantly overlap the interests of WG 1. Recently, collaboration with IEC TC100/TA9 has been initiated relative to gateways.

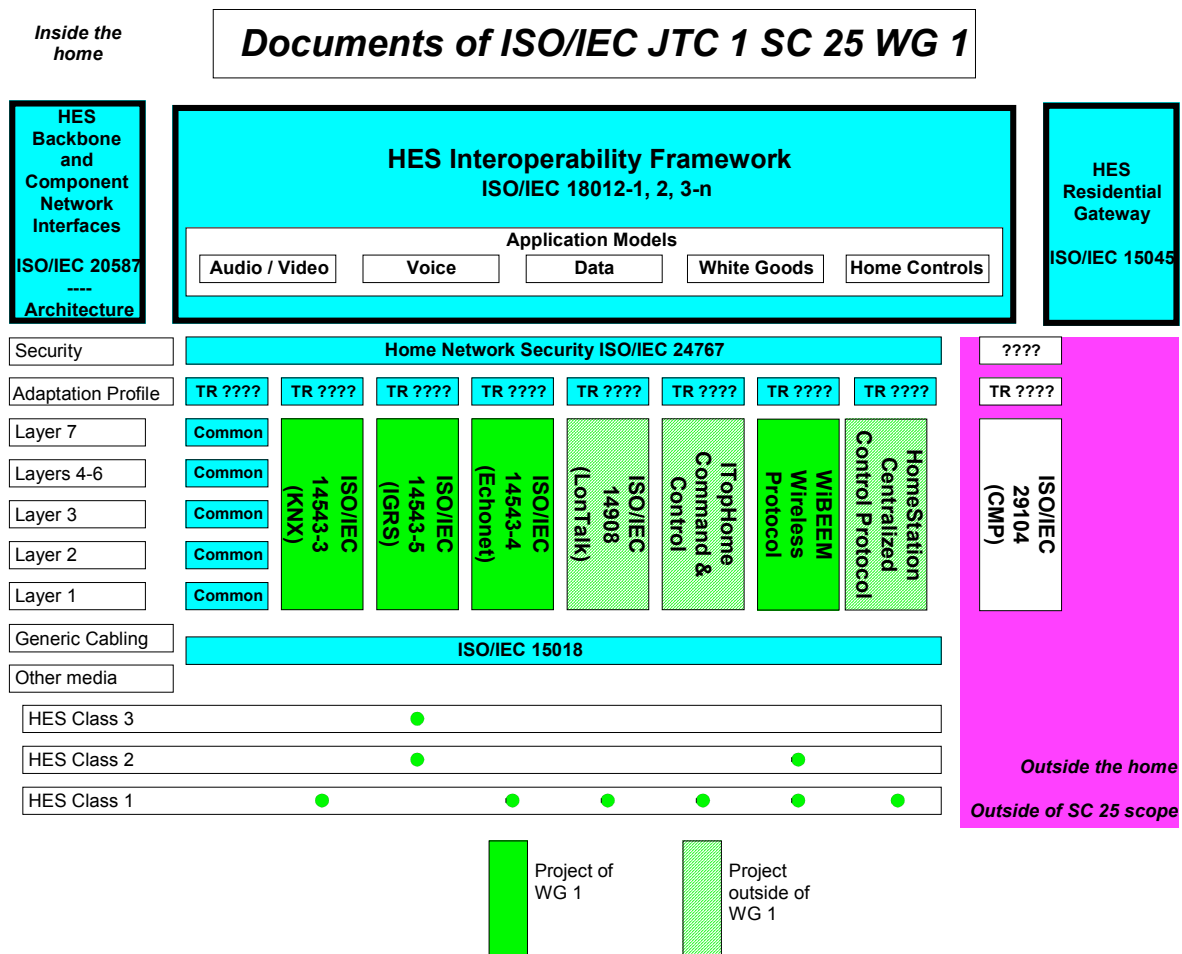


Figure 1 — WG 1 Program of Work Conceptual Model

During 2006 and 2007, mounting interest in home systems and networks resulted in an impetus toward the standardization of national and regional standards, and consortia specifications within SC 25 and WG 1. As a result the decision was taken to invite proposals for the standardization of lower layer protocols and network management protocols. Figure 1 represents a consensus to adopt an “multi international standards” method at the Edinburgh meeting in September of 2005, and on a consensus of the anticipated future program of work that

grew from later discussions at the Beijing meeting of WG 1 in March of 2006 and the Tours, France meeting in March of 2007.

The author has participated in WG 1 since 1987 (Tokyo) and served as Secretary since 1990 (Kyoto).

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ⁱ In the late 1980s, WG 1 worked closely with and held joint meetings with WG 12 (Digital Control of Systems) of IEC TC84 (Equipment and Systems in the Field of Audio, Video and Audiovisual Engineering). WG 12 was eventually reorganized within IEC TC100 (Audio, Video and Multimedia Systems and Equipment).

ⁱⁱ OSI refers to the Open Systems Interconnect Reference Model for Communications, consisting of seven layers, where layer 1 is the physical medium (wire, radio, etc.).

ⁱⁱⁱ The term “residential gateway” appears to date from a 1987 I’DATE (Montpellier) conference paper, “CEBus, ISDN and the Residential Gateway.”