

Synopsis

Power over Ethernet (PoE) is defined by IEEE 802.3af to deliver up to 12.95 watts over structured cabling. This is being used initially to supply remote power to wireless access points, video surveillance cameras and Ethernet-based IP phones. Future plans are to support a much larger family of devices that require higher levels of electrical power. This is an overview of IEEE 802.3af plus details of an initiative to develop a higher power version known as PoE-plus. Market trends and opportunities for PoE are also reviewed.

1. The Market for Remote Powering

The emergence of Voice over IP (VoIP) raises the issue of "lifeline voice" or emergency callout service, which requires the terminal equipment to be permanently powered. Power over Ethernet (PoE) has been developed to support this and a series of other requirements, such as remotely powered wireless access points, web cameras and building management systems.

IDC estimated the worldwide market for PoE as 11.7 million ports in 2003. This is expected to grow at a rate of 65% per annum over the period 2003-2008 to reach 134 million ports in 2008. In December 2004, IDC estimated the penetration of PoE as 36% in all LAN-attached IT equipment.

The electrical power required to operate IP telephony *Etherphones* is 3-6 watts, single band wireless access points 4-11 watts and Ethernet NICs 8-12 watts. These fall comfortably within the 12.95 watt capability of IEEE 802.3af. Plans are now underway to extend the power delivering capacity of PoE to support devices listed in figure 1.

Market	Application	Power
WLAN	Dual-band access points	~20W
	802.11n access points	~20W
	Outdoor access points	20-30W
Security	PTZ network cameras	15-20W
IP Telephony	Video phones	15-25W
New Markets	RFID readers/access control	up to 25W
	802.16 base stations	15-60W
	Workgroup switches	up to 50W
	Residential gateways	~20W
	Industrial sensors	1-30W
	Laptops	up to 70W
	POS + information kiosks	13-60W

Figure 1: Electrical Power Requirements for Future LAN-attached Devices

Market size and growth for higher power applications are currently difficult to estimate, as this will depend on the amount of power that can be delivered in the enhanced version of PoE. The market potential for wireless access points alone is particularly exciting, as indicated in figure 2.

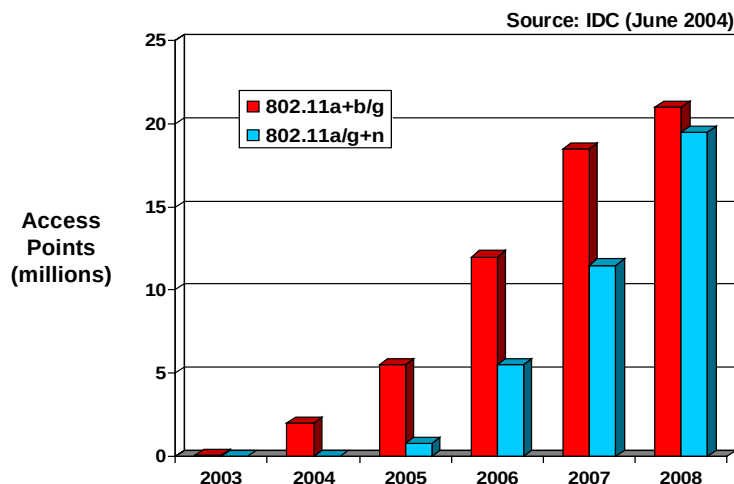


Figure 2: Worldwide Forecast for Wireless LAN Access Points

2. PoE-plus

A study group was established within IEEE 802.3 in Nov 2004 to investigate the feasibility of higher power delivery than IEEE 802.3af.

IEEE 802.3af assumes 40 ohm dc loop resistance, which is not representative of today's cabling (this is less than 25 ohms). Ohms law calculations alone suggest an ability to deliver at least 30 watts by utilising all 4 pairs. The reserved *Class 4* mode is being examined as a convenient mechanism to manage higher power modes. Study group investigations are intended to identify a practical level of higher power plus schemes for power forwarding and also power redundancy.

IEEE 802.3at was established in September 2005 to specify higher power delivery than 12.95 watts. The following project objectives were agreed:

1. 802.3af will be enhanced, hence no new 802.3 standard
2. target cabling infrastructure is ISO/IEC 11801 1995 Class D or higher
3. there shall be no safety issues for legacy installations, conformant with IEC 60950
4. the PSE shall be power-limited and be SELV compliant, according to IEC 60950
5. a PSE shall operate all modes of 802.3af as well as enhanced modes
6. the enhanced PoE standard will provide maximum power to a PD as allowed by practical limits
7. at least 30 watts power shall be delivered to a PD
8. new PDs will indicate to the user that they are attached to a legacy PSE and require higher power
9. FCC/CISPR Class A and B shall be met for all supported PHYs
10. extension of existing power classification to support PoE-plus modes shall be investigated
11. operation of mid-span PSEs for 1000BASE-T shall be investigated
12. operation of mid-span and endpoint PSEs for 10GBASE-T shall be investigated, including the provision of cable heating data for evaluation by 802.3an
13. isolation requirements will be revisited
14. new PDs within the power range of 802.3af will work properly with 802.3af PSEs
15. PD operation based on PSE will be as follows:

	802.3af PSE	802.3at PSE
802.3af PD	operates	operates
802.3at PD ≤12.95w	operates	operates with extended power classification
802.3at PD >12.95w	PD to provide active user indication	operates with extended power classification

3 types of Powered Device (PD) are envisaged:

- 802.3af (up to 12.95w via 2 pairs)
- 802.3at medium power (possibly up to 25-30w via 2 pairs)
- 802.3at high power (possibly up to 50-60w via 4 pairs)

3. PoE-plus Development Plan

IEEE 802.3at is expected to be approved as a standard in 2008. The development plan is shown in figure 3.

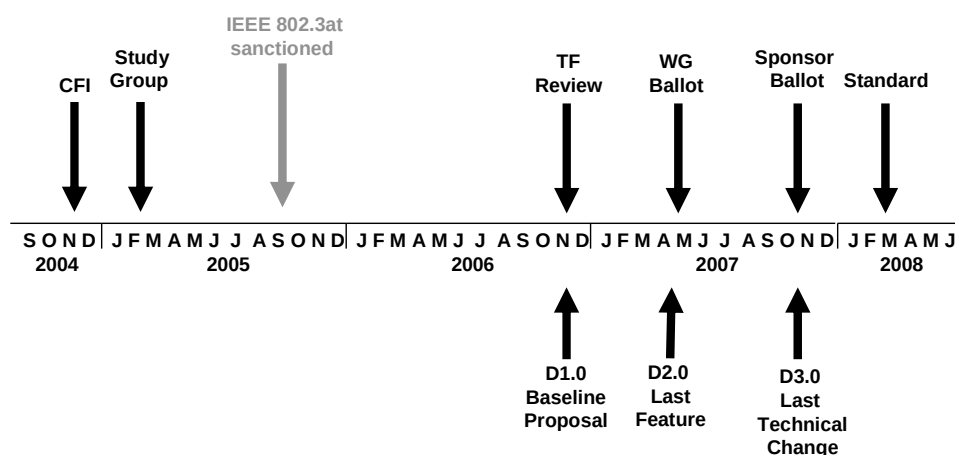


Figure 3: IEEE 802.3at PoE-plus Development Plan

About Brand-Rex

Brand-Rex is a designer and manufacturer of copper and fibre based cabling systems, headquartered in Glenrothes, Scotland with facilities across Europe. Brand-Rex has two primary businesses: Connectivity and Speciality. Its Connectivity division designs and manufactures cabling systems (both copper and fibre) for data communications and is the No.2 player in Europe. The Speciality division exclusively produces cables that are used for control, communications, power and instrumentation within hostile environments.