

Home Networks at Glance

The Networking Technologies

The home user willing to move toward multimedia networks requires some decisions regarding the proper networking technology to be used.

Currently few technologies are available by many vendors for home data networking. However, not all of them are ready for multimedia networks (i.e. integrating TV channels, video, audio, telephony and data sources over the same infrastructure).

The oldest and basic technology is the Ethernet, where Cat-5 cable has to be installed all over the home in a star configuration. However, many users are looking for the "no new wires" solutions that do not require changing home infrastructure at all. In many cases two or more technologies are used simultaneously. The options are:

- Wireless network based on IEEE 802.11g/b/a and by end 2008 - 802.11n.
- Home telephone lines – HomePNA3.0 & 3.1
- Home coax cables (cable/satellite) – MOCA, HomePNA3.0 & 3.1
- Home powerlines – HomePlug Turbo & HomePlugAV

Note: Several other technologies exist but they are not suitable for home multimedia (like cellular), or they are too expensive to be deployed commercially.

The next table, summarize all technologies relatively to Ethernet.

Technology	Utilization	Intervention
Ethernet	Mainly for business applications or short distances (router-PC)	<ul style="list-style-type: none"> • Relatively limited range • Star configuration (installation barrier) • Requires cable installation
Wireless	Utilized everywhere	<ul style="list-style-type: none"> • Very limited communication range depends on many factors • Star configuration (limits the range) • In many cases requires relays for full coverage • Communication data rate drops dramatically due to interferences • Interferences from home/wall structure, home appliances (as: microwave, DECT phones, control systems) and neighbor's interferences. • Privacy
Phone lines	Wide spread at home	Non
Coax Cables	Mostly at rooms with TV sets	Non (depends on the technologies)
Powerlines	Exist everywhere	<ul style="list-style-type: none"> • Limited range • Multi-phase problems • Interference from adjacent equipments • Privacy • Problematic regulations

Networking Technologies Suitability for Multimedia

The key parameters for multi-channels multimedia network are:

- Data Rate – the packets speed
- Actual throughput – the actual channel real-time throughput (sometimes measure as percentage of channel data rate)
- Quality of Service (QoS) – measure the ability to define a minimum steady channel throughput for multimedia network channel
- Bandwidth - the ability to handle multi streams simultaneously.
- Communication range – ideal (theoretical) and effective distance
- Propagation Delay – the amount of time it takes to transfer the signal end to end

The next table summarizes the parameters per available technologies -

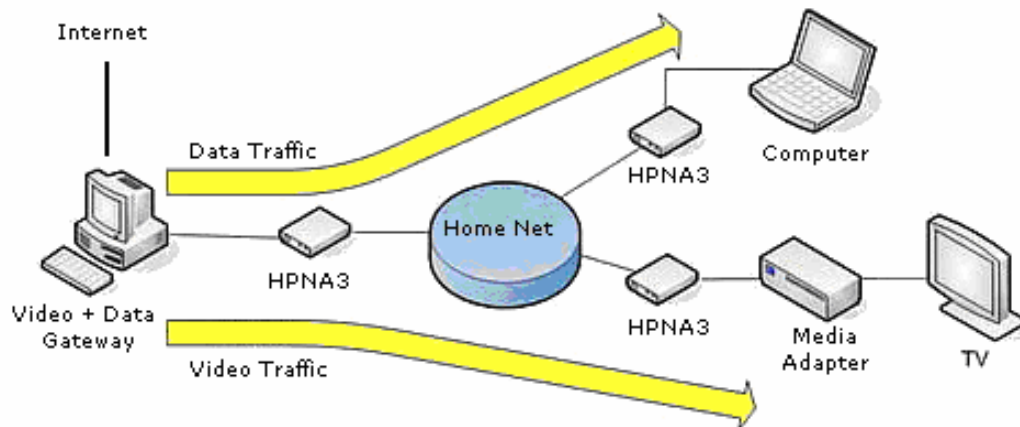
Technology	Max. Data Rate	Throughput	QoS	Multi-Stream	Useful Range	Delay	Notes
Ethernet	1GB	66%	Yes	Yes	60m	Low	Usual 100Mbps
802.11g	54Mbps	30%	No	No	20m	High	108Mbps exist
802.11a	54Mbps	35%	Some	No	25m	High	
HomePNA3.0	128Mbps	70%	Yes	Yes	300m	Low	Tuned for Multimedia
HomePlug Turbo	85Mbps	25%	Some	No	30m	Medium	Old technology
HomePlug AV	200Mbps	30%	Yes	Yes	35m	Low	

The Future is Here

Common home multimedia services includes IPTV/VOD streams, TV channel, Internet browsing, games, Audio and more. The basic required bandwidth in order to support (at least) one of each application is based on the next calculation:

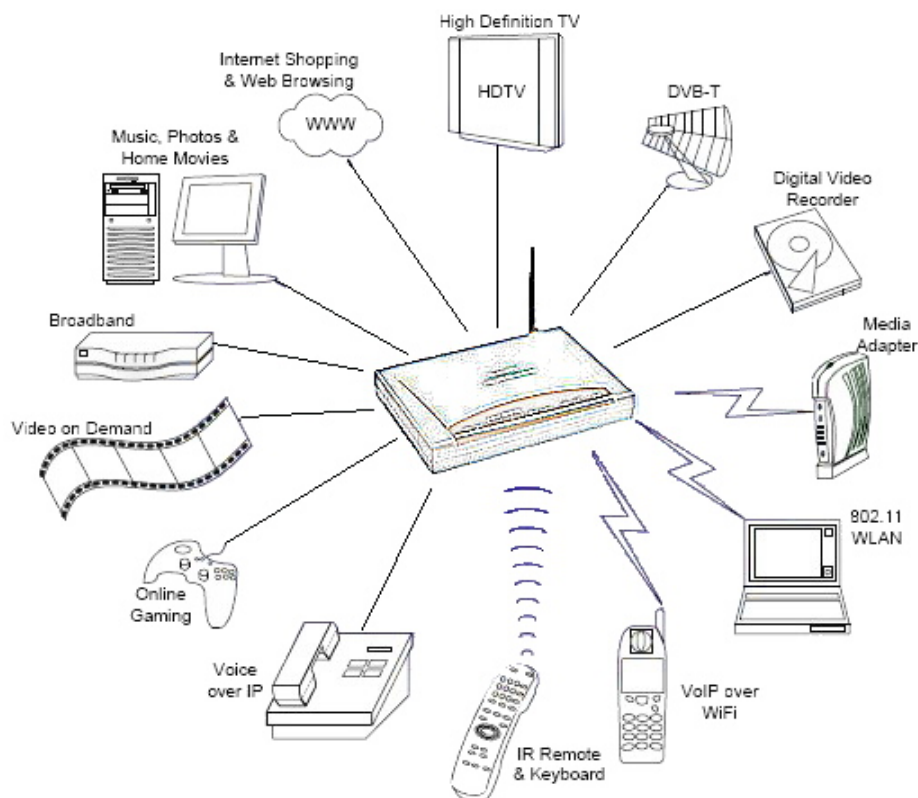
Service Type	Rate Mbps	Requires QoS
HDTV	20	Yes
High Quality MPEG 2	8	Yes
Home Theatre Audio	5.8	Yes
Video Conference	1.5	Yes
Internet Browsing	1	
Online Game	1	Yes
Toll Quality IP Phone	0.1	Yes
Typical House:	30-40	Yes

Many homes have several TV sets and several PCs immediately it could be understood that the current networks are facing an implementation revolution.



Conclusions

- It is easily can be seen from the above analysis that the current wireless technologies are not suitable for multimedia applications.
- The powerline technologies still don't have a suitable solution for home electricity multi-phase grid. As a shared media it has limited capabilities to support actual multimedia system requirements.
- The HomepNA3.0 is the only technology that currently is fully suitable in order to support efficient and high quality multimedia networks as well as all current and future home network applications.



Please contact info@powernetsys.com for any further questions regarding the above.