

A.1 Additional material from Home Equipment section

In the following, the Usage Cases missing in the main body of the Home Equipment Section are included. That provides a complete tool-set for the Service Integrator to propose a complete SmartHouse to his customers.

A.1.1 Communications [external]

A.1.1.1 SmartHouse Usage Cases [external] Communication services

In today's digital communication, we can no longer distinct voice, images and data. In all these cases digital data are being exchange between the (external) information supply process on the sending side, i.e. the information source, and the information processing on the receiving side, i.e. the information sink.

Still there may be communication requirements, which differ from on Communication service to another, such as a required QoS level and which must be reflected in the to be selected SmartHouse communication terminal device.

[External] Communication service providers' business models foresee in principle to expand their communication services to provide [One-stop] Media bundles by adding content such as

- Information/News via well organized Internet Portals
- storage repositories for customers digital photos and images
- (paid) Music downloads
- Pay-per-view [streaming] TV
- (paid) video-on-demand

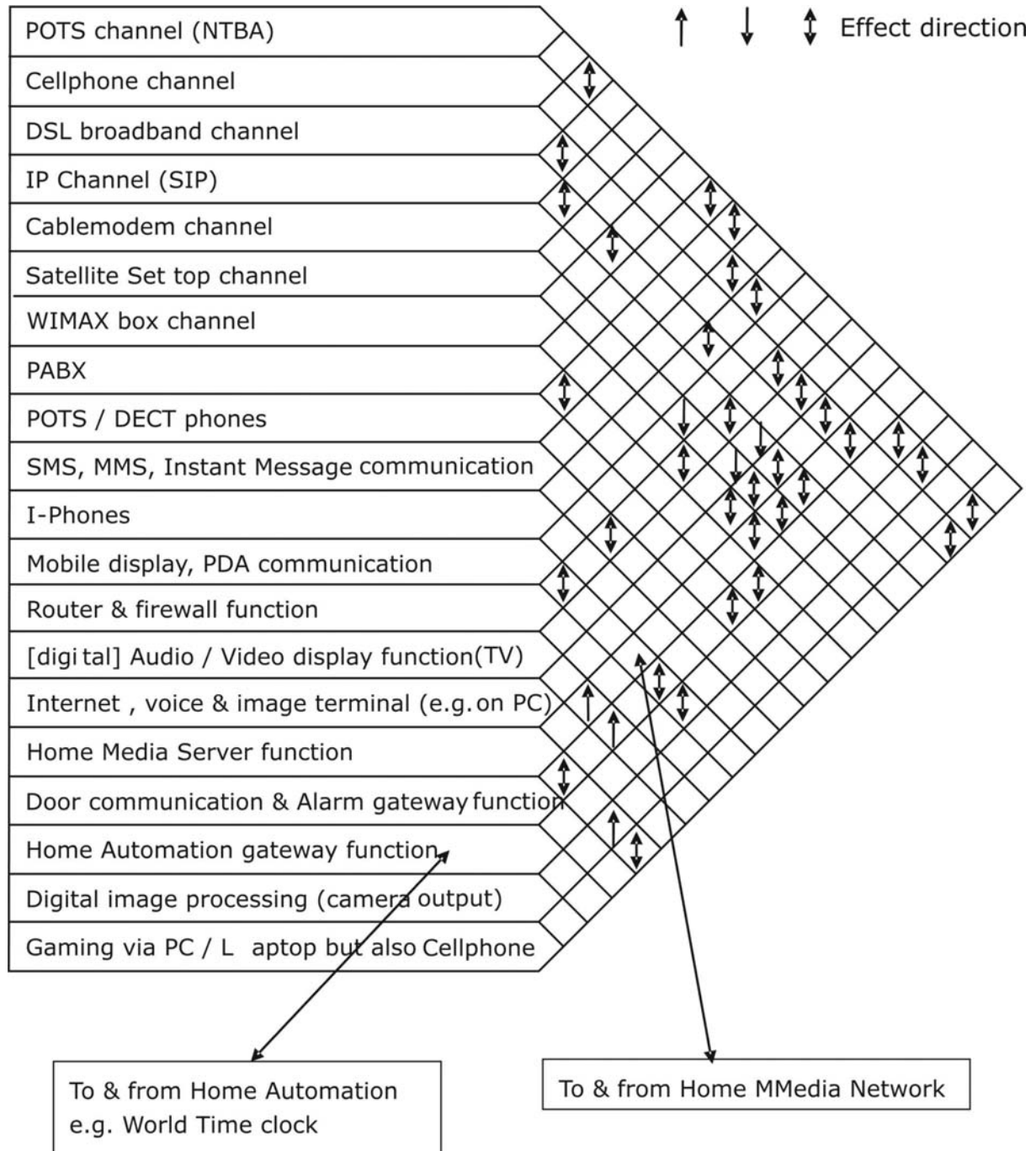
and even open their Portals to third parties whilst continuing to handle, where necessary, appropriate μ Payment clearing systems.

A.1.1.2 [external] communication service and [external] Communication channels

[external] communication services	[to be] specified [external] Communication channel	
Voice (& image)		direct local access
SMS, MMS, Instant Messaging	POTS, [analogue and/or] digital switched networks	distributed access:
		- wired via PABX,
		- wireless via DECT
		- via gateway to door and surveillance cameras - via gateway to Home Automation and Alarm systems
	mobile Cellphone (also Satellite phone)	direct local access
communication specifics: user telephone No / IP address; extensions: redial, multical, automatic answering	Cablecom (originally TV distribution only):	via cable modem
	broadband cable	direct and/or distributed (=routed) local access
	IP channels and SIP protocol for VoIP, videotelephony and instant messaging	QoS requirement; access via IP routers e.g. for iPhones
Internet; information source and/or sink	Telco:	direct local access
	- analogue modem	distributed access via router, with appropriate firewall functions:
	- ADSL broadband	- wired via Ethernet
		- wireless via WiFi - via gateway to door and surveillance cameras - via gateway to Home Automation and Alarm systems
includes also gaming	Cablecom (originally TV distribution only):	via cable modem
	broadband cable	direct and/or distributed (=routed) local access
	3G cellphone	WAP, I-mode and alike
image storage and processing	WiMAX (802.16) Worldwide Interoperability for Microwave Access constituting wireless 50km square Metropolitan Access Networks (MAN) to Network Termination box	direct local access
		distributed access via router, with appropriate firewall functions:
		- wired via Ethernet
		- wireless via WiFi - via gateway to door and surveillance cameras - via gateway to Home Automation and Alarm systems
	Satellite DSL via satellite dish and Set-top box;	direct local access
	backchannel via POTS or cellular network	distributed access via router, with appropriate firewall functions:
		- wired via Ethernet - wireless via WiFi
Audio / Television (=> DVB, DAB)	Terrestrial or Satellite dish reception to Set-top box;	direct local access
		to TV or
		to extended Set-top box (=> Media Server) for media routing
		- wired via Ethernet - wireless via WiFi to different media sinks
	Cablecom TV distribution	direct local access
	to Set-top box	to TV or
		to extended Set-top box (=> Media Server) for media routing
		- wired via Ethernet - wireless via WiFi
		to different media sinks
	TCP/IP channels	streaming Audio / Video

A.1.1.3 SmartHouse [external] Communication services Usage Case Communication Matrix

[external] communication services provided normally by one single contracting entity



A.1.1.4 [external] Communication service and [external] Communication channel Objects

For Specific Design complete this external Communication Services usage matrix by marking linked rooms, areas and central functions, as appropriate include in each marking the type of in-house communication channel to be used: direct D, telephone T, broadband coax C, broadband Ethernet E, wireless W Excel sheet permits to calculate Design, installation and commissioning totals		SmartHouse Rooms and associated areas															
		one story apartment / multistory house (select as appropriate)											central functions				
		distribution panels	porch / entrance	staircase	corridor	night corridor	living	kitchen	storage	sleeping	bathroom	children 1	children 2	cellar	Home Media Server	Surveillance Cameras	door communication
[external] communication services	Communication Channel																
Voice (& image)																	
SMS, MMS, Instant Messaging	POTS, [analogue and/or] digital switched networks																
	mobile Cellphone																
communication specifics: user telephone No / IP address; extensions: redial, multical, automatic answering	Cablecom (originally TV distribution only): broadband cable																
	IP channels and SIP protocol for VoIP, videotelephony and Instant messaging																
	Telco:																
	- analogue modem																
	- ADSL broadband																
Internet																	
includes also gaming	3G cellphone (for WAP, i-mode etc.)																
	Cablecom (originally TV distribution only): broadband cable																
image storage and processing																	
	WIMAX (802.16) Worldwide Interoperability for Microwave Access constituting wireless 50km square Metropolitan Access Networks (MAN) to Network Termination box																
	Satellite DSL via satellite dish and Set-top box; backchannel via POTS or cellular network																
Audio / Television (=> DVB, DAB)																	
	Terrestrial or Satellite dish reception to Set-top box;																
	Cablecom TV distribution to Set-top box																
	TCP/IP channels for Streaming Audio / Video																

A.1.2 Home Automation Usage cases

Home Automation is achieved by proper deployment of HBES technology. HBES, i.e. in full “Home and Building Electronic Systems”, as standardized by CENELEC TC205 defines the set of requirements for controlling and automating SmartHouse processes according to users needs. Such a radically decentralized and distributed approach makes use of these so-called BUS networks.

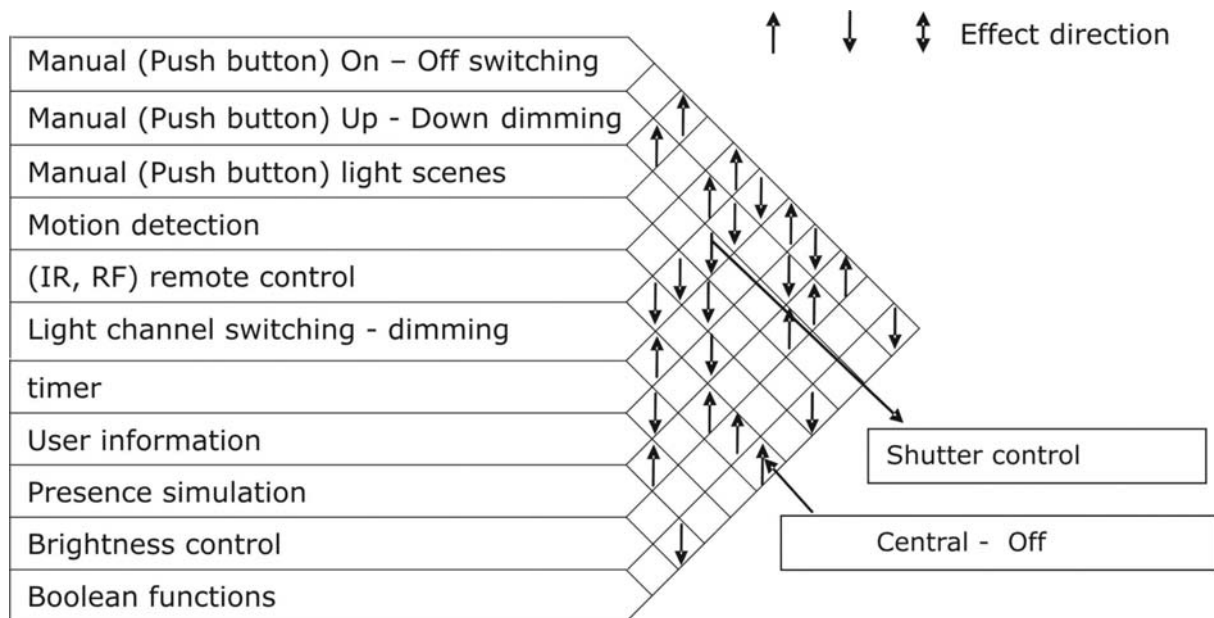
Such BUS Networks do not only provide a powerful standardized intercommunication at runtime between the devices’ [process or “Functional Block”] objects but also an enhanced set of services and mechanisms for network management, i.e. network configuration and commissioning.

A.1.2.2 SmarHouse HA Usage Case: Lighting control

A.1.2.2.1 Lighting control Usage Case: Application(s) and functions

Applications	Functions	
manual (Push button) switching	On - Off command	one to n switches at different places
and/or	Start - Stop Dimming command	push button for up and down dimming; serves normally also for On - Off
(IR, RF) remote control	Light scene(s) control	push button activates the controller(s) pre-programmed light scenes; possible interaction with shutter(s)
Motion detection	[temporary] On command	normally directly combined with timing function
Light channel(s)	lighting load switching or dimming	light channel(s) being switched on and off and/or dimmed up or down by actuator;
timer	delayed switch-Off	timing function normally incorporated in Light channel actuator
User Information	Display	LED [or more sophisticated display] to signal "Light-On" status at specific place(s)
Presence simulation	automatic Light On - Off, Dim Value	automatic On - Off / Dim Value according Presence Simulator memory
brightness control	light level sensing	sensing (selected) illumination level
	illumination level control	interworks with dimming actuator;, and possibly interaction with shutter(s)
boolean functions	controlling interaction between different input signals	interaction between automatic and manual (override) signals; can be incorporated in actuators; particularly important for a Central - Off / Presence simulation

A.1.2.2.2 Lighting control Usage Case Objects



A.1.2.4 SmartHouse HE sage Case: Heating (& Cooling) control

A.1.2.4.1 Heating (& Cooling) control Usage Case: Application(s) and functions

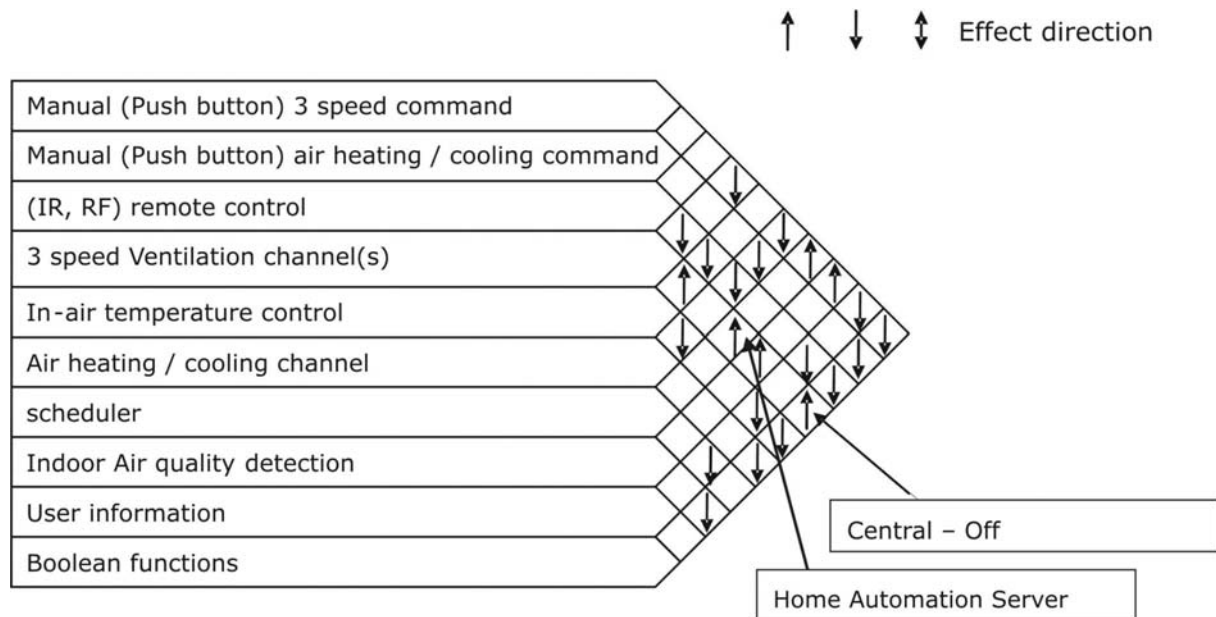
Applications	Functions	
Indoor temperature sensing	indoor room temperature	normally integrated in the different room temperature controller
dew point sensing	indoor room dew point	normally integrated in the different room temperature controller
	zone (e.g. floor / ceilings)	normally integrated in the different zone temperature controller
Window / door open monitoring	signals opened windows and/or doors	normally interacts with different room temperature controller; information can be "re-used" in alarm systems
central or individual indoor room temperature control	PI-room temperature regulation	either pulse width or linear output; temperature set-point(s) preset at commissioning
individual indoor zone temperature control	PI-zone temperature regulation	either pulse width or linear output; temperature set-point(s) preset at commissioning / floating outdoor temperature optimized
Hot (& cold) water heating (cooling) channel(s)	radiator / zone valve control load	either pulse width controlled all-or-nothing valves or linear valves
room / zone heating (& cooling) scheduler	heating (& cooling) scheduling	week day and calendar dependent / central-off (absence) override
temperature sensing	outdoor temperature	often integrated in boiler controller
Boiler (Burner) control	flow water temperature sensing	normally integrated in boiler / chiller controller
	heat (& cold) demand control	evaluates room / zone control heat / cold demand signals
Chiller control	heat (& cold) circuit circulation pump control	normally dependent on heat (& cold) demand control
Domestic hot water supply control	Domestic hot water supply temperature & circulation pump control	normally integrated in boiler control; temperature set-point(s) preset at commissioning
Solar collector temperature sensing	Solar collector temperature	normally integrated into Solar domestic hot water controller
Solar domestic hot water control	Solar collector liquid circuit circulation pump control	temperature limiter set-point preset at commissioning
User Information	Display	LED [or more sophisticated display] to signal fan speed / temperature
set-point user intervention	central set-point manager	part of more sophisticated Home systems => Home Automation Server
Boolean functions	controlling interaction between different input signals	required for arranging proper interaction between the different heating / cooling functions; interaction with Central - Off

A.1.2.5 SmartHouse HA Usage Case: Ventilation control

A.1.2.5.1 Ventilation Aircon control Usage Case: Application(s) and functions

Applications	Functions	
manual (Push button) switching	3 speed command	ventilation: off, speed 1, 2 or 3
(IR, RF) remote control	air heating /cooling command	temperature set-point preset at commissioning
ventilation channel	3 speed ventilation channel	ventilation 3 fan speeds activated by combination of 2 channels
in-air temperature control	PI-temperature regulation	pulse width relative value up / down
air heating (cooling) channel(s)	heating control load or heating/cooling control load	heat exchanger power dimmer reversible speed controlled heat pump
scheduler	automatic, scheduled ventilation	can be week day or calendar dependent
Indoor Air quality detection	automatic ventilation	Indoor Air quality level set-point preset at commissioning
User Information	Display	LED [or more sophisticated display] to signal fan speed / temperature
boolean functions	controlling interaction between different input signals	interaction with Central - Off

A.1.2.5.2 Ventilation control Communication matrix



A.1.2.6 SmartHouse HE Usage Case: Central Functions & Gateway function(s)

A.1.2.6.1 Central Functions & Gateway function(s) Usage Case: Application(s) and functions

	IR, RF bridges / small local gateways	remote controls	typical low cost remote controlling of Home Automation functions (see the different applications)
	Window / door open monitoring	signals opened windows and/or doors	already available from heating application - completes a separate [insurance validated] Alarm System
applications best served by adding a Home Automation Server	access control	to permit access by user and/or authorized person(s)	normally part of [a separate] door communication system; however (possible) integration into Home Automation [server] and AV networks permits enhanced services; activated - from inside button, - outdoor button pad - via (mobile / DECT) telecontrol phone gateway - AV and related server network permits specific image recording for Burglar Alarm validation (see Security System Cluster !)
	clock / scheduler	master clock and scheduler	[possibly] synchronised from external RF VLW transmitter or Internet Atomic clock; schedules programmed at commissioning; either autonomous device or incorporated into Home Automation Server
		slave clock and scheduler	in extended systems; synchronized by master clock; schedules programmed at commissioning or via Home Automation Server
	Boolean filtering	control filtering	functions to enable interaction of different applications via control filtering by Boolean units (e.g.as part of a Home Automation Server);
	Central-Off	puts different SmartHouse resources into safe and/or low power position	programmed Central-Off is particularly important for handicapped: to be activated by their distress signal !
	Presence Simulation	controller "plays back" recorded typical Home Automation signals	pre-condition a Home Automation network; either specific controller or [better] integrated into Home Automation Server
	technical alarms	abnormal event logs or device status information	Home Automation Server : event logs, status and service information from Home Automation network, e.g. connected household appliance(s)
	remote controlling via phone networks	remote interaction with devices connected to the HE network	via POTS / DECT or mobile telecontrol phone gateway
	Meter reading	meter event (e.g. pulse) to permit energy and water consumption logs	Home Automation Server : event logs, status and service information from Home Automation network, e.g. connected household appliance(s)
	remote controlling via IP networks, including WiFi & Bluetooth	remote controls and/or remote information retrieval	remote controls and/or network commissioning; remote information, e.g. camera image retrieval
User Information	Display	(preferably mobile) sophisticated visualisation unit, e.g. LCD screen and/or PC	
user intervention	keyboard, PDA, etc.	sophisticated Home systems UI => Home Automation Server	

A.1.2.6.3 Central Functions & Gateway function(s) Usage Case Objects

		SmartHouse Rooms and associated areas																
		one story apartment / multistory house (select as appropriate)																
For the specific design, complete this Central Control and Link-to-Gateway matrix by marking linked rooms and areas as appropriate plus amount of applications & functions (==> impact on devices) The Excel sheet permits to immediately calculate required equipment totals and related design, installation and commissioning time foreseen applications and functions		distribution panels	porch / entrance	staircase	corridor	night corridor	living	kitchen	storage	sleeping	bathroom	children 1	children 2	cellar 1	cellar 2	terrace / balcony	attic	garden
	IR, RF bridges / small local gateways	remote controls																
	Window / door open monitoring	signals opened windows and/or doors																
applications best served by adding a Home Automation Server	access control	to permit access by user and/or authorized person(s)																
	clock / scheduler	master clock and scheduler																
		slave clock and scheduler																
	Boolean filtering	control filtering																
	Central-Off	puts different SmartHouse resources into safe and/or low power position																
	Presence Simulation	controller "plays back" recorded typical Home Automation signals																
	technical alarms	abnormal event logs or device status information																
remote controlling via phone networks	remote interaction with devices connected to the HE network																	
Meter reading	meter event (e.g. pulse) to permit energy and water consumption logs																	
remote controlling via IP networks, including WiFi & Bluetooth	remote controls and/or remote information retrieval																	

A.1.2.7 Consumer Electronics [and in-House communication]

A.1.2.7.1 SmartHouse CE (Consumer Electronics) Usage Case

This CE cluster relates to the SmartHouse in-house deployment of different Consumer electronic equipment, electronic appliances and their [possible] linking to in-house Multimedia networks. This cluster is closely associated to the SmartHouse [external] Communication cluster.

Apart from supporting exploitation of different [external] Audio / Video / Image / Information Media services, the main CE requirements are

- typical CE low-cost systems from CE markets, easy to install, even in Media networks, and easy to use
- i.e.no lengthy boot, no complex configuration, no typical system crashes and blue screens
- clear usage guidance supportive User guidance such as EPG (electronic Programming Guide), MHP (interactive multi-media Home platform)
- easy search of stored sound, video, image, play lists, collections and upcoming programs
- interoperability according to agreed Audio / Video and DRM standards (MP3, MPEG2, MPEG4, DVIX5, DRMx), both live and streaming media
- upcoming HDTV standard proof

- timeshift Personal Video Recording (PVR); tag-mark Audio recording, Flash memory image recording, compatible storage on DVD
- to support easy Wireless PnP networking of all CE equipment
- to support modern flat video display and video beamers, multi-channel audio equipment
- easy access to Information, Media and gaming software on PC and Internet.

A.1.2.7.2 SmartHouse CE (Consumer Electronics) Usage Case Applications and Functions

CE applications	functions	
inhouse Voice (& image) communication	[analogue and/or] digital communication	[intercom / babyphone]
		distributed access: - wired via PABX, - wired / wireless / via in-house IP channel and I-Phone - wireless via DECT - via gateway to door and surveillance cameras [direct access via smart Cellphone]
Audio / Television (=> DVB, DAB)	Terrestrial or Satellite dish reception to Set-top box;	for direct access by stand-alone TV, Audio, gaming, display devices
	Cable TV distribution via Set-top box	incl (=> HDTV) Home Theater
	private Media channels: own playback and/or recording devices - Audio / Midi / MP3 / video (VHS) - digital CD/DVD	usage control by - adaptable remote control - PDA - display-DECT (could be even adapted cellphone)
sound, images and videos	own digital still and videocams	
	DSL broadband	direct local access - by PC, smart PDA, display phone
	& Firewall	- [high processing power] dedicated gaming platform
	& Router & IP channel	- to surveillance cameras
Internet; information source and/or sink	- wired via Ethernet	- household appliance(s)
	- wireless via WiFi	- via gateway to / from Home Automation and Alarm systems
	and/or distribution via easy to connect and easy to use Media server and	for pay-per-view, video-on-demand, streaming Audio / Video, Audio / movie download
	- in-house, wired and/or	- decoding for listening and display,
	- wireless Media network	- encoding for recording on PVR, CD/DVD, Flash
		- image storage
		- game storage and gaming support
		distributed access by - TV, mobile listening & viewing
		to / from other information appliances.

A.1.2.8 SmartHouse Security Systems Usage Case

Whilst the extend of selected Applications and Functions below depend on each individual case one can perceive the substantial overlap with Applications and Functions of typical Home Automation usage cases. Hence a skilled System Designer, when preparing his offer, will surely look into possible synergies.

A.1.2.8.1 SmartHouse Usage Case Security Systems: Applications and Functions

Applications	Functions	
Security system	Local interaction	Monitoring of all elements integrated into Security System: - Gates, doors, and windows - Movement detectors - Surveillance cameras - Gas and water sensors - smoke - Baby - Disabled - Car parked outside Local signalling and direct interaction, - e.g. gas and water leakage closes valve(s), - opens vents, - starting / stopping ventilation system Master Switch, when leaving, for possible remote signalling and/or intervention And /or scheduler
Remote Surveillance and interaction	Signalling via network and Home Server / gateway	Status information, directly from surveillance sensor to pre-defined remote place, - on alarm event - when polled possible interaction
CCTV image capturing	On intrusion detection activation of alarm validation	CCTV images of corresponding zones are - recorded and/or - forwarded to predefined destinations, e.g. - security management - user's mobile phone - Internet accessibility

A.1.2.8.3 SmartHouse-Security System Usage Case Objects

SmartHouse Rooms and areas associated to the Security System		distribution panels	porch / entrance	staircase	corridor	night corridor	living	kitchen	storage	sleeping	bathroom	children 1	children 2	cellar	terasse / balcony	attic	garden	External car
one story apartment / multistory house (select / expand as appropriate)																		
For the specific design, complete this Security System matrix by marking linked rooms and areas as appropriate plus amount of applications & functions (==> impact on devices) The Excel sheet permits to immediately calculate required equipment totals and related design, installation and commissioning time																		
foreseen applications	and functions																	
Security system including	Gates, doors, and windows																	
	Movement detectors																	
	Surveillance cameras																	
	Gas and water sensors																	
	smoke																	
	Baby																	
	Disabled																	
Car parked outside																		
Direct local interaction	Status / Alarm Signalling (light, sound, display, images)																	
	Direct interaction:																	
	closing valves																	
	opening vents																	
	starting / stopping ventilation (alarm) lighting																	
activation	Master switch																	
	Scheduler																	
	Threshold manager																	
Alarm server / gateway concept	Access point function																	
Remote services (signalling, controlling)	Signalling																	
	Status polling																	
	Remote interaction, Via																	
	mobile cellphone																	
	POTS INternet																	
Camera sunveillance	Image sampling, CCTV																	
	Image recording																	
	e.g. for alarm validation																	

A.1.2.9 Telematics

Though the range of Telematics services has expanded, safety and security remain the primary reason why current users and consumers subscribe to Telematics' services.

Typical Telematics applications are being found in the automotive and transportation market segment. Available applications combine several services into a single end-device. The hardware modules generally comprise a global positioning system (GPS) receiver and a mobile telephone, integrated into a single unit, to offer not only traffic and tourist information, navigation support with Real-time traffic monitoring and rerouting, localization and vehicle tracing in case of theft, but in particular, in view of the tremendous increase of electronics in cars, emergency and vehicle breakdown assistance. Air bag deployment calls which are automatically routed to the Emergency lines are becoming part.

There are activities to develop a set of common specifications for a multimedia interface to vehicle electronic systems in order to service a wide variety of computer based electronic devices in the vehicles. In the light of the ever increasing traffic congestion, there are already system studies to develop ways on helping to adapt driving habits and even to exert an intelligent speed control. In view of the equipment quantities at stake this will surely have an impact also on the SmartHouse applications.

Directly SmartHouse related are Telematics developments to extend to monitoring of people's health, correct medication and the status of handicapped and elderly.

It is surely possible to extend some of the above Usage cases to Telematics'. Interesting synergies become visible, when applying

- Home Automation, e.g. in case of distress cutting of appliances and putting resources into safe state,
- and/or Security systems, e.g. to unlock doors for help
- CE systems to convey important information.

However in view of the involvement of major stake holders in developing Telematics and related services doing so would probably be besides the mark and is therefore left out.

At any rate its is suggested that a System Designer interested in Telematics should consider in the first place the above Communication Usage cases and expand from there as appropriate. The different examples above will guide him

- to establish his own Application and Function Matrices,
- to prepare and fill in the related Communication Matrix and
- devise the Object Matrix, to support his offer calculation.