

# **Joint ITU - AICTO Workshop on “Interoperability of IPTV in the Arab region”**

**(Dubai, UAE, 20 – 21 September 2011 )**

## **ITU-T H.762 LIME Interactive Multimedia Application Interoperability**

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# LIME Background

- Internet ubiquity, faster broadband access
- Enhanced content / datacasting, interactivity
- Early attempts: web browsers in TVs
  - ➔ lean forward problem
  - ➔ inadequate user interface
  - only remote controller: no mouse/keyboard

LIME:

Lightweight Interactive Multimedia Environment

# LIME Background

- Standards:
  - ➔ W3C CSS TV
  - ➔ CEA-2014: Developed by CEA (USA)
  - ➔ MHEG: used in UK (red button)
  - ➔ BML: used extensively in Japanese Digital TV (ISDB)
  - ➔ LIME: ITU-T Recommendation H.762
    - consented in 2009
    - uses BML and Web standards
    - targets IPTV

# LIME design considerations

- Synchronization among multiple sources
- Simplification of navigation (no mouse)
- Rendering tailored to TV

Contextual Information

News

Weather

Traffic

On-demand portal

A B C D E

Group C

	NET	JPN	DEN	CMR	P	W	D	L	G
Netherlands		1-0	2-0		6	2	0	0	3
Japan	0-1			1-0	3	1	0	1	0
Denmark	0-2			2-1	3	1	0	1	-1
Cameroon		0-1	1-2		0	0	0	2	-2

Menu Standings Players MyPage

Blue Red Green Yellow

Live TV



LIME

## LIME (ITU-T H.762)

- LIME: “*Lightweight Interactive Multimedia Environment (LIME)*”
- Based on common Web-practices like HTML, CSS, DOM and Javascript (= ECMAScript)
- Easy integration of Video (both Linear streaming and VOD)
- Suitable for different types of Terminals; e.g. TV set, STB, Mobile phone, PC, etc.
- Agnostic as to the DTV standard
  - **Content from ATSC, DVB, ISDB can be used with LIME**
  - **LIME over DVB is being discussed at ITU**

# Overview of ITU-T Recommendations for IPTV

## Home networking

H.622.1: Req & Arch for IPTV Home networks

## Applications and end-systems

H.750: Metadata for IPTV Services

H.721: IPTV Terminal (Basic)

H.770 : IPTV Service discovery

H.761: Ginga-NCL

H.740: Application Event Handling

H.762: LIME

H.763.1: Cascading style sheets for IPTV services

ITU-T H.762  
LIME for IPTV

## Architecture, requirements, network

Y.2007: NGN Capability Set 2

Y.sup5 IPTV Service use cases

Y.sup7 NGN Release 2 Scope

Y.1910 IPTV Functional Arch

Y.1901 IPTV Service Requirements

## Quality of Experience

H.701: Content Error-Recovery

G.1080: IPTV QoE

G.1081: Performance Monitoring

G.1082: Improving robustness of IPTV performance

## Security and Content Protection

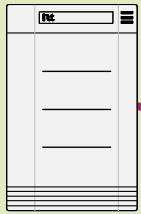
X.1911 Req & arch for IPTV security

# ITU-T IPTV Standards

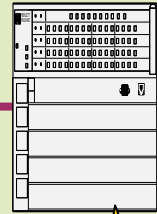
## IPTV domains

### ITU-T IPTV end-end solution

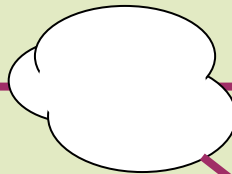
Content provider



Service provider



Network provider



Gateway

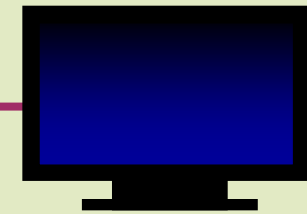


End user

H.700 Series

H.721

IPTV set-top box



PC

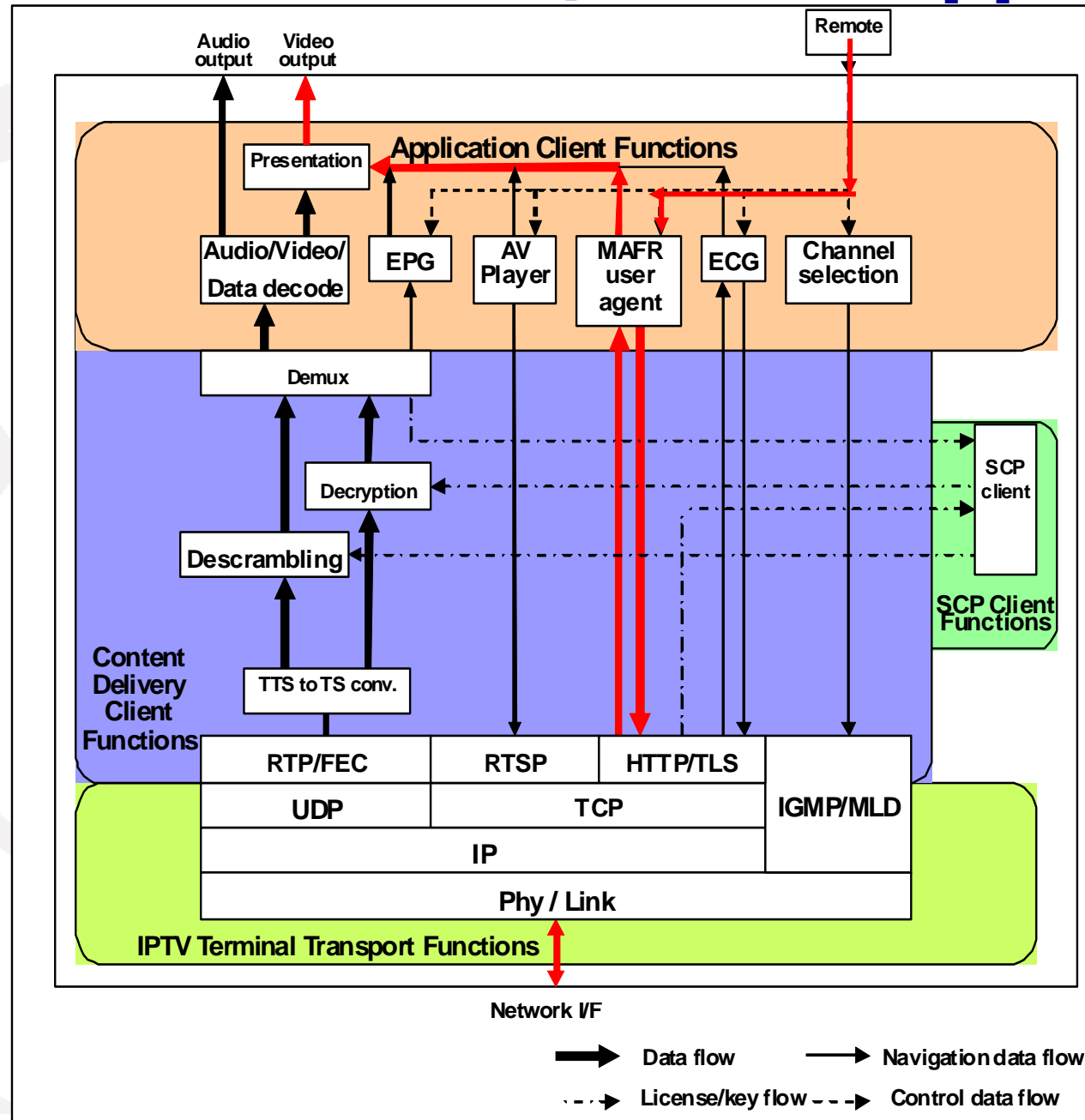
TV

Mobile

Web server provides LIME documents

User agent renders LIME documents

# IPTV Terminal w/LIME support



From H.721  
Appendix II



# ITU-T H.762 LIME

International Telecommunication Union

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
OF ITU

**H.762**

(12/2009)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

IPTV multimedia services and applications for IPTV –  
IPTV multimedia application frameworks

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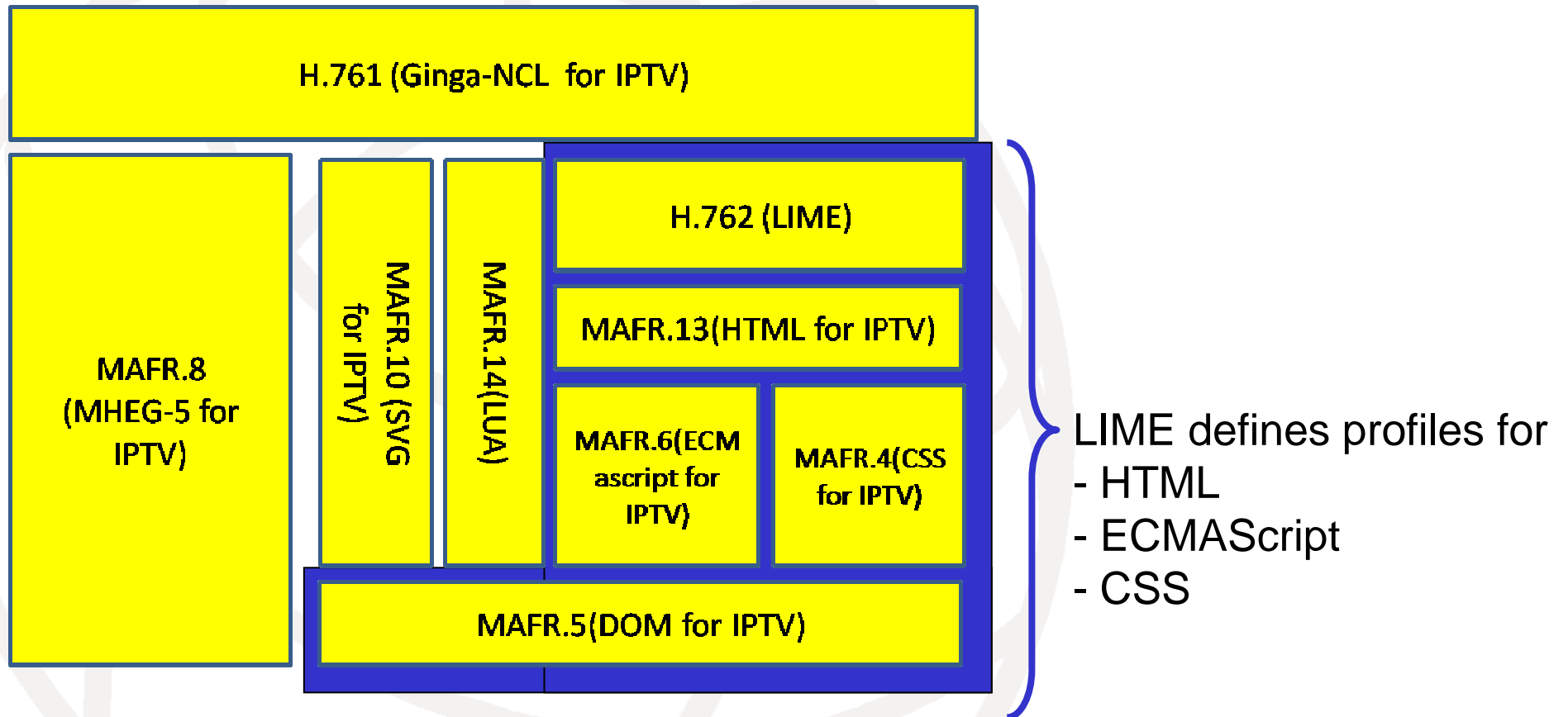
**Lightweight interactive multimedia environment  
(LIME) for IPTV services**

Recommendation ITU-T H.762

ITU-T



# MAFR Recommendations



# LIME HTML Extensions

- ***bevent* and *beitem***

Event control. Events sent from the station to the receiver to trigger an action. E.g. synchronize contextual data with main content stream (e.g. sports statistics).

- ***body& invisible***

switches off the document to let main service (usually a TV program) undisturbed

- ***onfocus/onblur*** attributes of ***div& p& span& object&*** address the lack of a mouse

# LIME XHTML Profile

Elements	Attributes
Core Attributes	
	id
	class
Events Attributes	
	onclick
	onkeydown
	onkeyup
Style Attributes	
	style
Core Modules	
body	%Core.attrib
	%Style.attrib
Text Module	
br	%Core.attrib
	%Style.attrib
div	%Common.attrib
p	%Common.attrib
span	%Common.attrib
Hypertext Module	
a	%Common.attrib

	accesskey
	href
Forms Module	
input	%Core.attrib
	%Events.attrib
	%Style.attrib
	accesskey
	disabled
	readonly
	maxlength
	type
	value
	inputnode
	charctype
Object Module	
object	%Common.attrib
	data
	type
Intrinsic Events Module	
a&	onblur
	onfocus
body&	onload

	onunload
input&	onfocus
	onblur
	onchange
Metainformation Module	
	name
	content
Scripting Module	
script	src
Style Sheet Module	
link	href
<u>LIME Extension Module</u>	
bevent	id
beitem	id
	type
	onoccur
	es_ref
	message_group
	id
	message_id
	message_version
	module_ref

	language_tag
	time_mode
	object_id
	subscribe
body&	invisible
div&	accesskey
	onfocus
	onblur
p&	accesskey
	onfocus
	onblur
span&	accesskey
	onfocus
	onblur
object&	streamposition
	streamstatus
	remain
	accesskey
	onfocus
	onblur

← Extensions  
(7 elements)

# LIME Script Profile

Subset of ECMAScript in LIME-script profile is limited to eight objects

- *global*
- *Object*
- *Function*
- *Array*
- *String*
- *Boolean*
- *Number*
- *Date*

# LIMEScript Profile Extensions

## Browser pseudo object functions

EPG functions	
	epgGetEventStartTime()
	epgGetEventDuration()
	epgTune()
	epgTuneToDocument()
	epgIsReserved()
	epgReserve()
	epgCancelReservation()
	epgRecIsReserved()
	epgRecReserve()
	epgRecCancelReservation()
Interaction channel communication- TCP/IP	
	setISPPParams()
	getISPPParams()
	connectPPP()
	connectPPPWithISPPParams()
	disconnectPPP()
	getConnectionType()
	isIPConnected()
	transmitTextDataOverIP ()
Operational control functions	
	reloadActiveDocument
	getNPT()

getProgramRelativeTime()
isBeingBroadcast()
lockModuleOnMemory()
unlockModuleOnMemory()
setCachePriority()
getIRDID()
getBrowserVersion()
getProgramID()
getActiveDocument()
lockScreen()
unlockScreen()
getBrowserSupport()
launchDocument()
launchDocumentRestricted ()
quitDocument()
getFreeContentsMemory()
isSupportedMedia()
detectComponent()
lockModuleOnMemoryEx()
unlockModuleOnMemoryEx()
unlockAllModulesOnMemory()
getLockedModuleInfo()
getBrowserStatus()
isResidentAppVersion()

isRootCertificateExisting()	
getRootCertificateInfo()	
Receiver audio control	
	playRomSound()
Timer functions	
	sleep()
	setInterval()
	clearTimer()
	pauseTimer()
	resumeTimer()
	setCurrentDateMode()
External character functions	
	loadDRCS()
Other functions	
	random()
	subDate()
	addDate()
	formatNumber()
Closed caption display control functions	
	setCCDisplayStatus()
	getCCDisplayStatus()
	getCCLanguageStatus()

**Extensions:  
8 categories**

# LIME CSS Profile

- Extended properties for
  - Color
  - Resolution
  - Aspect ratio
  - Navigation assuming a remote controller

# LIME CSS Profile

<b>Properties</b>
<b>Selector</b>
*
E
E:focus
E:active
E.myclass
#myid
<b>Media type</b>
@media
<b>Box model</b>
Margin
padding-top
padding-right
padding-bottom
Padding-left
border-width

border-style
<b>Background</b>
background-image
background-repeat
<b>Font</b>
font-family
font-size
font-weight
<b>Text</b>
text-align
letter spacing
white-space
<b>Pseudo class/ Pseudo element</b>
:active
:focus

<b>Visual formatting model</b>
position
left
top
width
height
z-index
line-height
display
<b>Other visual effects</b>
visibility
overflow
<b>Extensions</b>
clut
color index

background-color-index
border-top-color-index
border-right-color-index
border-bottom-color-index
border-left-color-index
resolution
display-aspect-ratio
grayscale-color-index
nav-index
nav-up
nav-down
nav-left
nav-right
used-key-list





# **LIME Examples**

# LIME datacasting example



# LIME Remote Controller example

IPTV  
Remote  
Controller

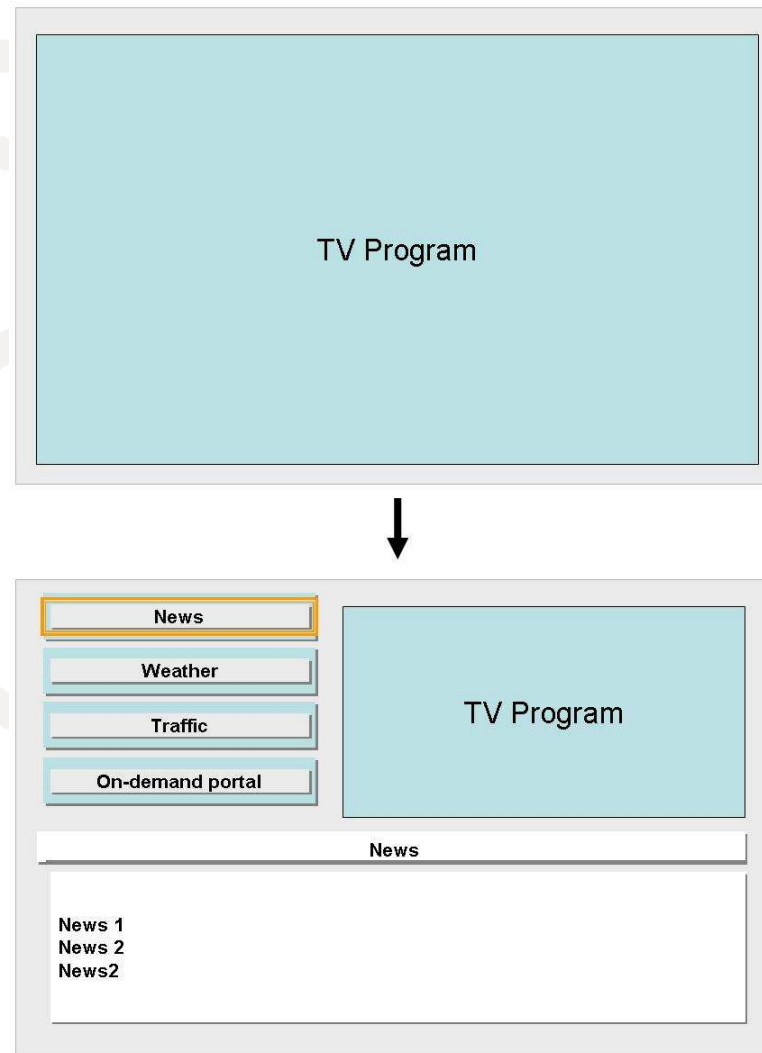


Color  
buttons

Up Down  
Right Left  
Arrow  
buttons

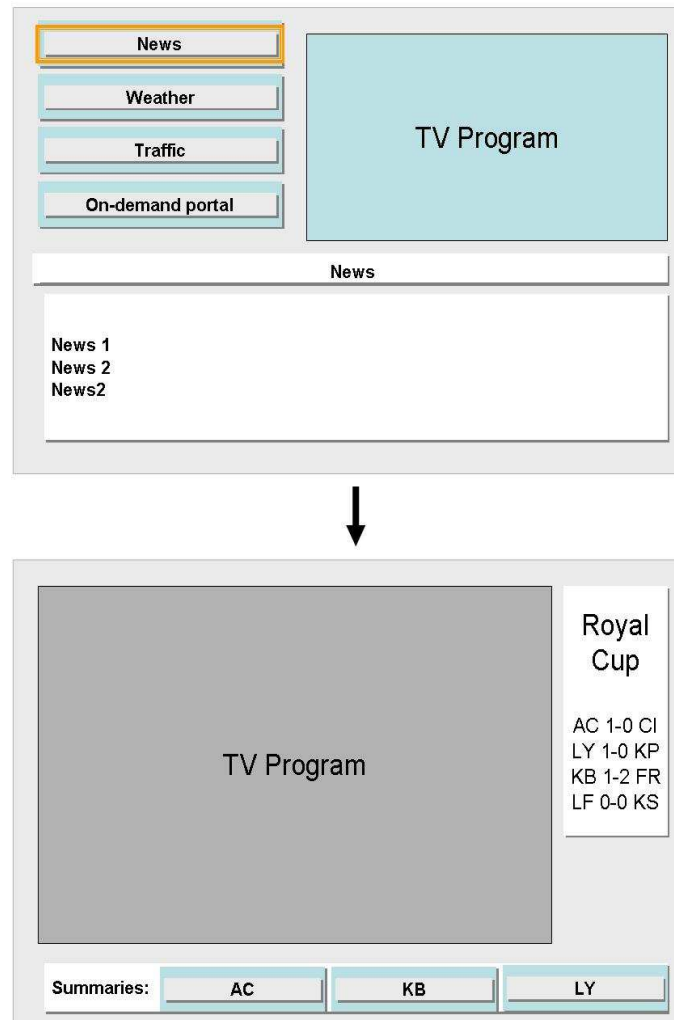
"d"  
Button

# LIME datacasting example



**LIME datacasting example**  
**Transition from Linear TV to Datacasting**

# LIME datacasting example



**Transition from a Linear TV program to another program while datacasting is enabled**

# Interop event for IPTV in Geneva



# Public Info Board on IPTV (Bus traffic Info)



Widget implemented with LIME (ITU-T H.762) for traffic information

- Check the route on the map
- Traffic condition of the bus routes
- Length of the Waiting queues (how long you would have to wait.)
- Signals your bus is arriving just 5 min. before the bus comes



# E-health Apps

IPTV widget

Consolidated reports

Server

Phone working as gateway

Normal programme



Blood pressure meter

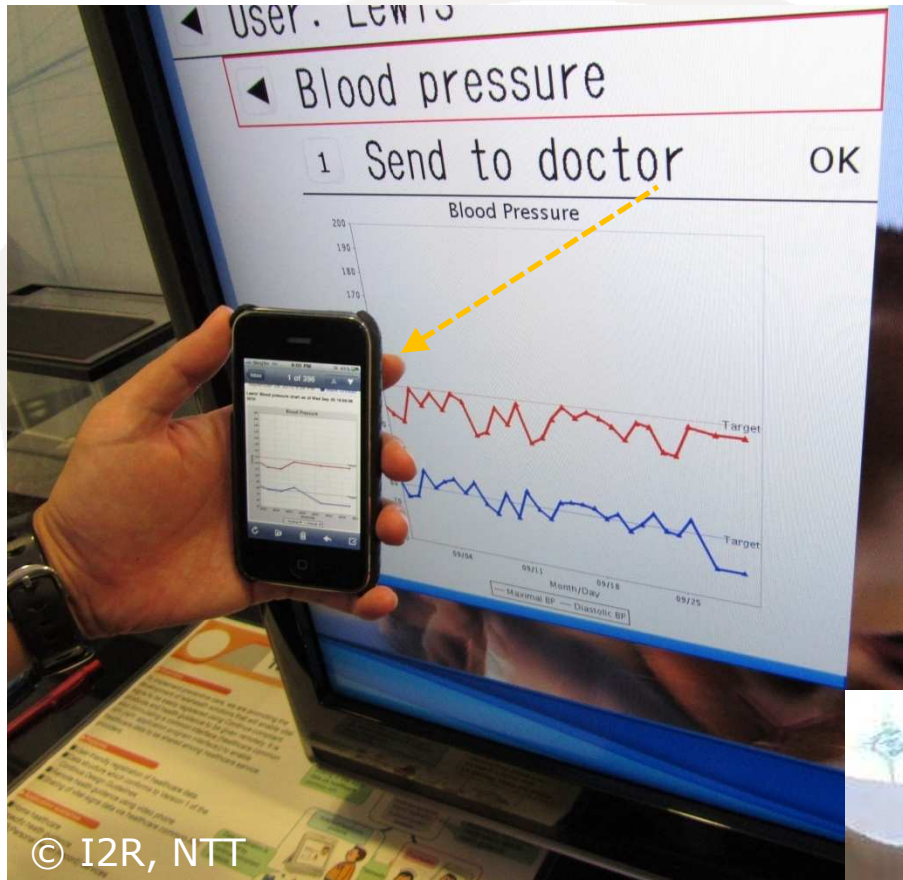
Pedometer

Scale

Widget implemented with LIME (ITU-T H.762) for e-health information collected from the user site, consolidated in the server backend and displayed on users' IPTV terminal device as a widget.



# E-Health



- LIME app does
  - ➔ Obtain health data and shows it on TV
  - ➔ Allows the user to send data to the doctor via e-mail
  - ➔ TV screen displays reply from the doctor with his professional advice



# Conclusions

- LIME design requirements target IPTV needs:
  - Presentation restrictions (e.g. color, font appropriate for displaying on a TV)
  - Navigation without a spatial UI device
  - Synchronization of contextual data with IPTV content
- LIME is based on open Web standards
- LIME is lightweight yet powerful enough
- Over 4 M IPTV terminals sold in the open market based on ITU-T Recommendations (STB, TV, PC)



**Thank you**