Broadcast-to-IP conversion for Wi-Fi indoor coverage

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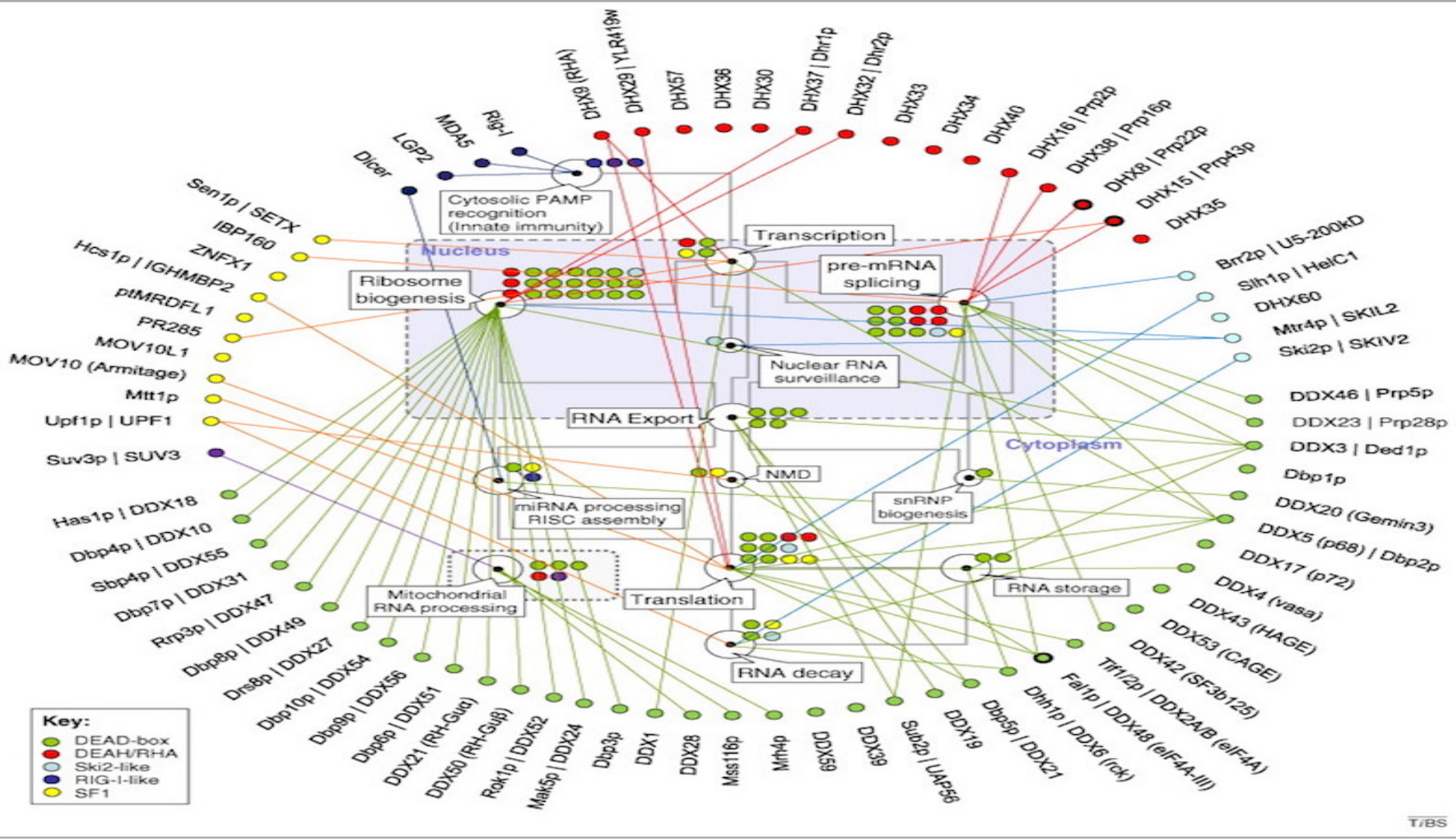
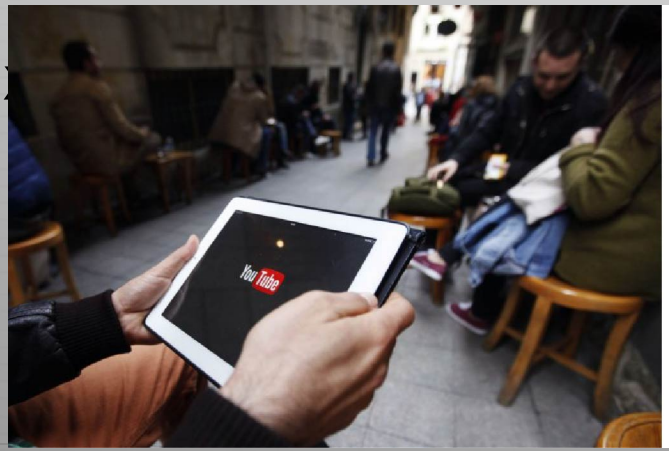
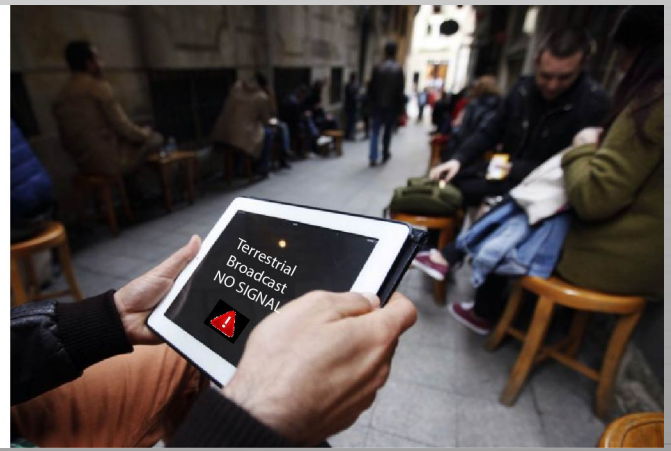

Cytosolic PAMP recognition (Innate immunity)
Nucleus
Transcription
pre-mRNA splicing
Ribosome biogenesis
Nuclear RNA surveillance
RNA Export
Cytoplasm
NMD
miRNA processing RISC assembly
snRNP biogenesis
Mitochondrial RNA processing
Translation
RNA storage
RNA decay
Key:
DEAD-box
DEAH/RHA
Ski2-like
RIG-I-like
SF1
Dicer
LGP2
MDA5
Rig-I
DHX9 (RHA)
DHX29 | YLR419W
DHX57
DHX36
DHX30
DHX37 | Dhr1p
DHX32 | Dhr2p
DHX33
DHX34
DHX40
DHX16 | Prp2p
DHX38 | Prp16p
DHX8 | Prp22p
DHX15 | Prp43p
DHX35
Sen1p | SETX
IBP160
ZNFX1
Hcs1p | IGHMBP2
ptMRDFL1
PR285
MOV10L1
MOV10 (Armitage)
Mtt1p
Upf1p | UPF1
Suv3p | SUV3
Has1p | DDX18
Dbp4p | DDX10
Sbp4p | DDX55
Dbp7p | DDX31
Rrp3p | DDX47
Dbp8p | DDX49
Drs8p | DDX27
Dbp10p | DDX54
Dbp9p | DDX56
Dbp6p | DDX51
DDX21 (RH-Guc)
DDX60 (RH-Gub)
Rok1p | DDX52
Mak5p | DDX24
Dbp3p
DDX1
DDX28
Mss116p
Mrh4p
69XDD
DDX39
Sub2p | UAP56
DDX19
Dbp5p | DDX21
Dhh1p | DDX6 (rck)
Fal1p | DDX48 (eIF4A-III)
Tif1/2p | DDX2A/B (eIF4A)
DDX42 (SF3b125)
DDX53 (CAGE)
DDX4 (vasa)
DDX17 (p72)
DDX5 (p68) | Dbp2p
DDX20 (Gemin3)
Dbp1p
DDX3 | Ded1p
DDX23 | Prp28p
DDX46 | Prp5p
Mtr4p | SKIL2
DHX60
Slh1p | Helc1
Brr2p | U5-200kD
Ski2p | SKIV2

Videos on mobile devices

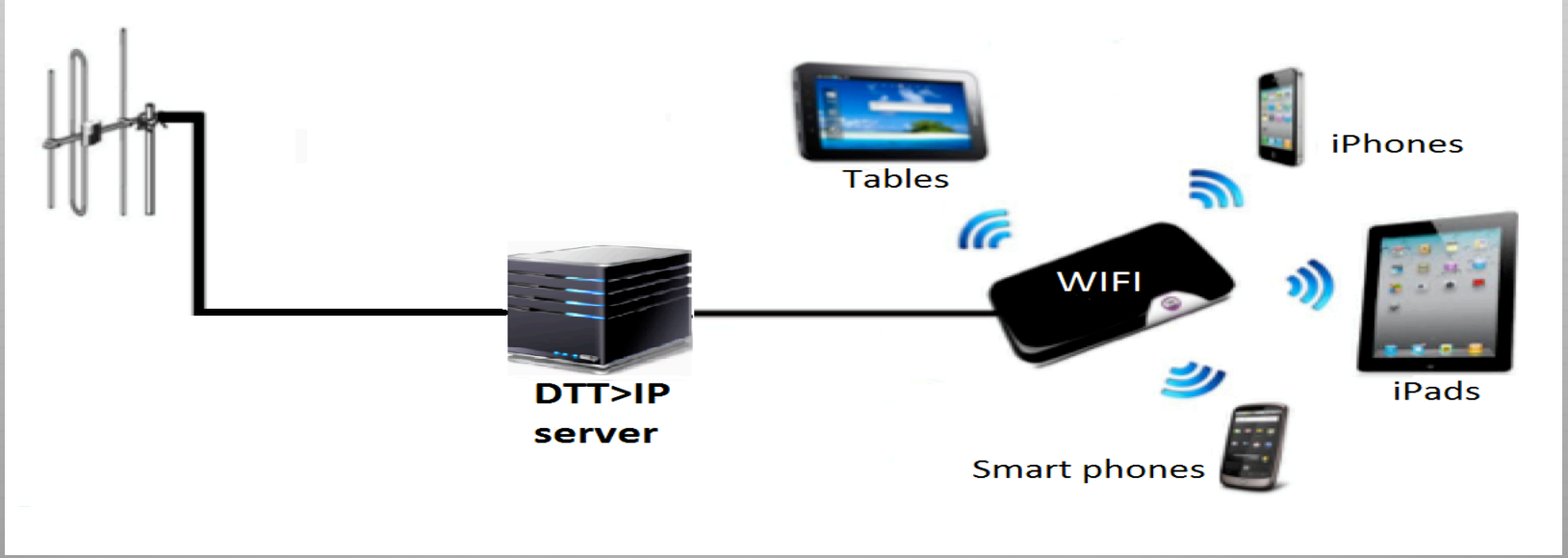
- YouTube, Netflix, Facebook, Google,Vevo, Vimeo, are all reaching the mobile devices
- What about Digital Terrestrial Television? DTT2IP ?
-



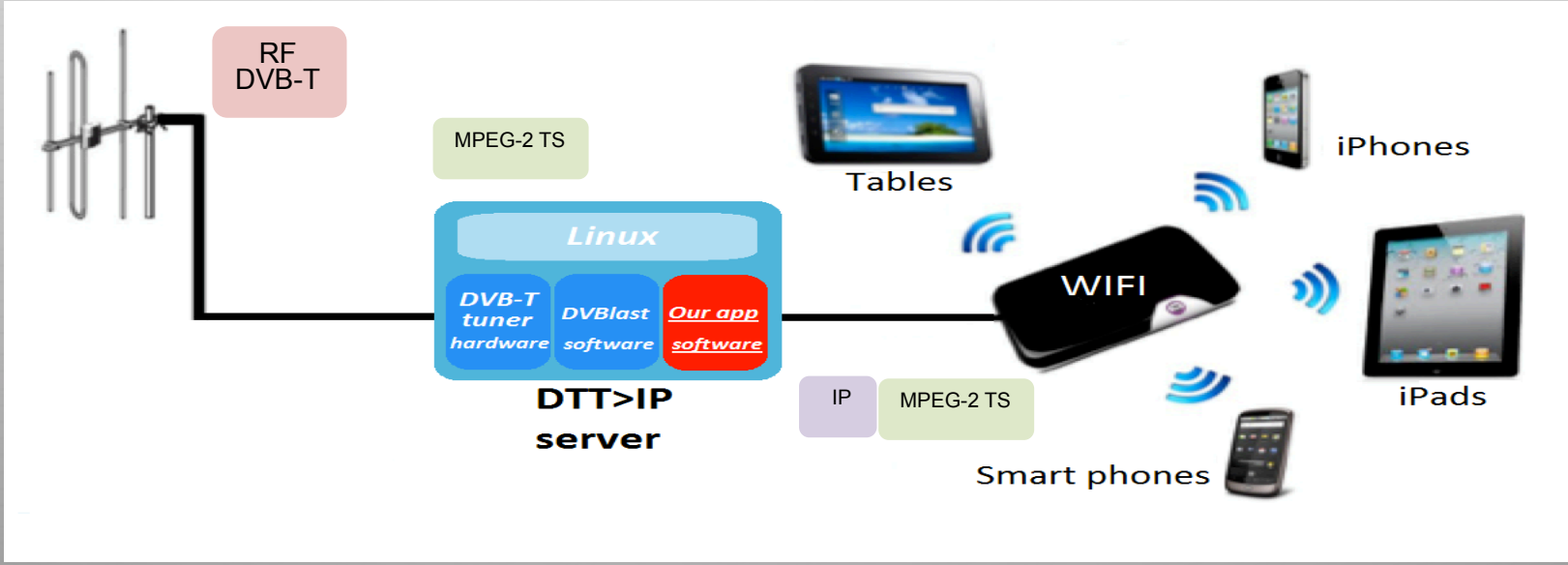


Our GOAL: DTT2IP

Implementation



Implementation

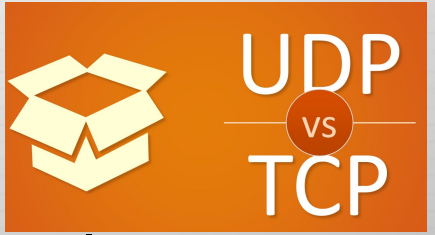


Our contribution

- Have an open source solution, from which everybody can benefit
- Make available on any hardware platform:
  - Linux / Windows PC (with VM installed)
  - Synology NAS
  - Raspberry Pi
  - Wi-Fi router
- Provide good and stable TV services

DTT2IP - problems

- Which transport protocol to use:
  - RTP/UDP vs. HTTP/TCP



- Architecture for the discovery protocol:
  - SAT>IP/SSDP vs. DLNA/UPnP

SAT>IP™

UPnP™

dlna℠

- Client applications/decoders
  - DVB features

DTT2IP v1.0

- Unicasted RTP for transport protocol
- DVBlast(VLC) as a video streamer
- SAT>IP: 1. SSDP server for the discovery protocol

  2. RTSP server for the management/control of DVBlast

DTT2IP v1.0 - Results

Pros	Cons
Multiple streaming to different users	Unsupported / Poor video quality for HD TV programs
Good video quality for SD TV programs	Scanning for services takes long time
DVB-T features (EPG, subtitles, Teletext)	No support for all devices (Windows phones, TV sets, PC)
2 Client applications available (Elgato and Tivizent)	No transcoding available
	No multicast available

DTT2IP v2.0

- Unicasted HTTP/TCP for the transport protocol
- MuMuDVB as a video streamer
- DLNA/UPnP server: 1. For the discovery on the network

  2. For the management / control of MuMuDVB

DTT2IP v2.0 - Results

Pros	Cons
Multiple streaming to different users	More bandwidth (~240Kbps)
Good quality for SD TV programs	More overhead compared with RTP
Improved quality for HD TV programs	No DVB-T features
Scanning of services is done only once (~1min)	More processing power required
Supported by all of the devices	
Transcoding now available	
More then 2 applications available	

Future work

- Have a stable and compatible UPnP server
- Implement transcoding, and MPEG-DASH, HLS
- Have DLNA clients displaying DVB-T features (i.e. EPG, Subtitles, Teletext, HbbTV)

Question?

Thank you!

https://github.com/ebu/dtt2ip