



# Using Microservices for the most agile, cost-effective Live Productions

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IP SHOWCASE THEATRE AT IBC - SEPT. 14-18, 2018



**Joop Janssen**

CEO Aperi

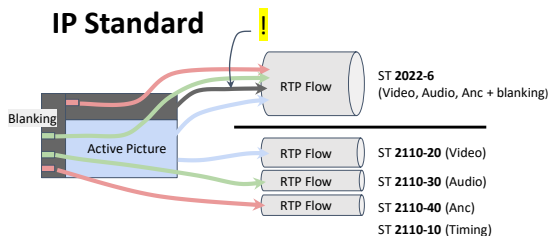
Camarillo, California





### The 3 key technology decisions that matter

#### IP Standard



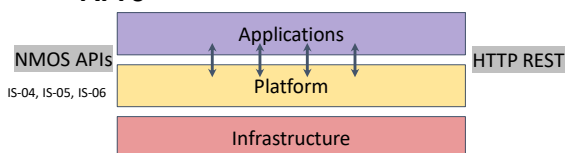
#### Virtualization

- Service, Function, HW abstraction
- Virtual Machines
- Service Oriented Architecture (SOA)

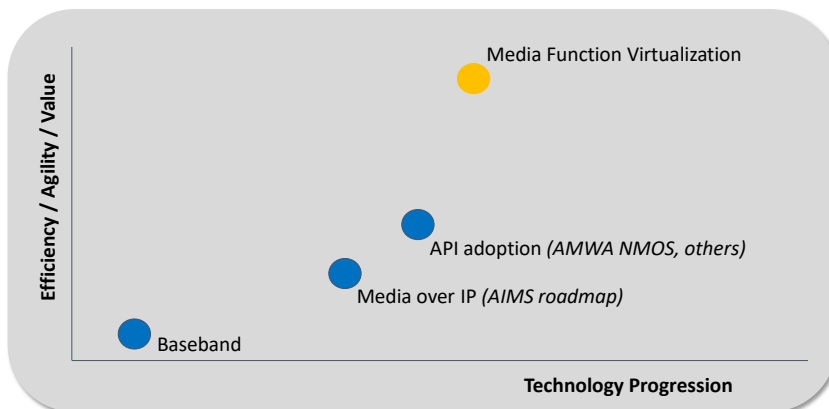
#### Benefits:

- Generic HW (high volume, reliable, economical)
- Location independence (start/stop operational agility)
- Metered, floating licenses, pay-as-you-use (Opex vs Capex)
- SW innovation speed (community)
- Elegant and fully protected architectures

#### API's

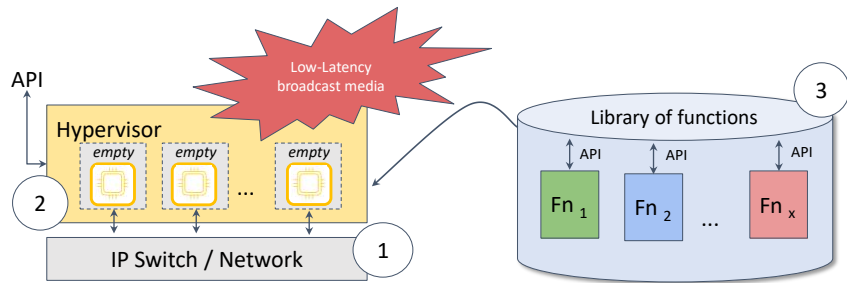


### Virtualization brings the biggest benefits (by far)

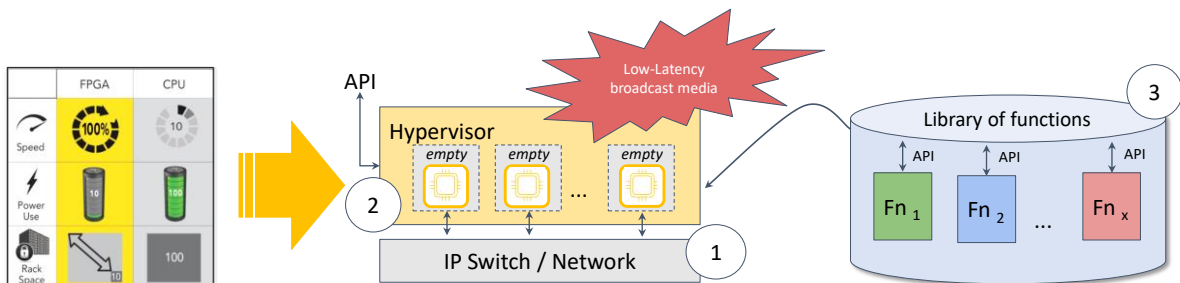




### Media Function Virtualization (MFV) – what is it?



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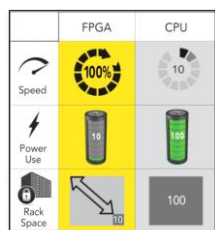
\*10C 2012. Channel count & video bandwidth dependent



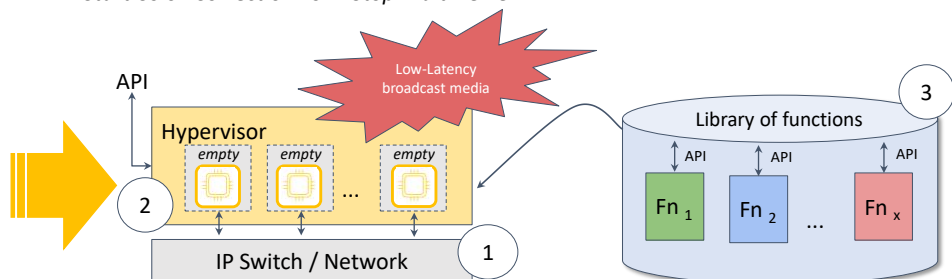


## Media Function Virtualization (MFV) – what is it?

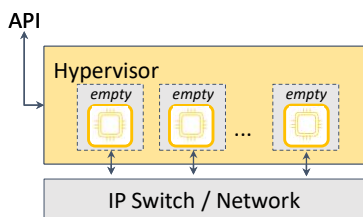
“Start Color-Correction” or “Stop Multiviewer”



\*10C 2013. Channel count & video bandwidth dependent



## Library of Broadcast, low-latency Functions (micro-services)



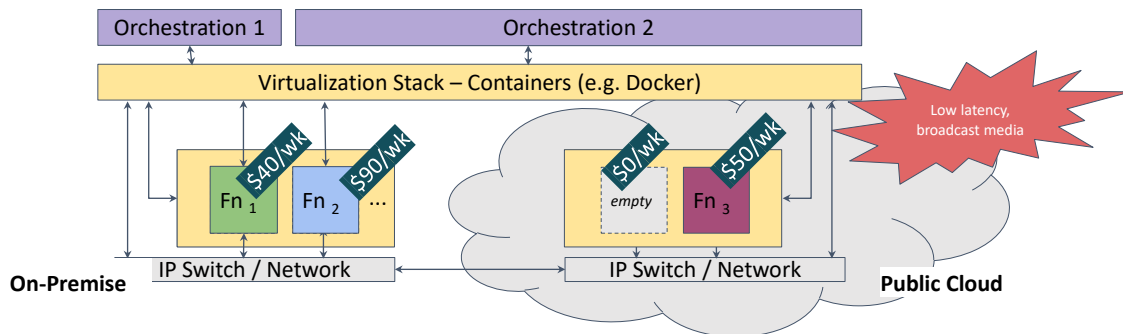
- Compression, Transcoding
- Multiviewer, Glue
- NAT & Firewall
- Rate-policed Ethernet trunking
- Networking, Clean-switching
- Production Switching
- Audio Mixing
- Graphics engines
- Slomo & Storage
- Talkback
- CCU, Colour -correction/shading
- ..... etc.



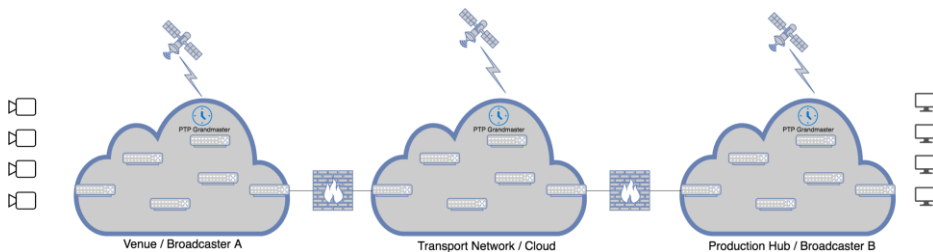


### Utility Pricing/ License Models

- Metered costing – Pay-as-you-Use
- Multi-Tenancy



### Timing and QoS – critical design choices

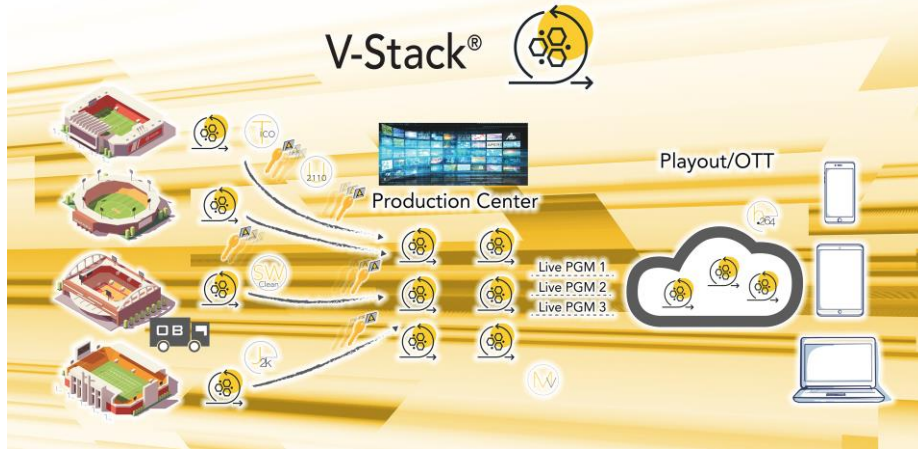


- Interconnection technologies must be carefully considered. 2110 or 2022 ?
- Choice of networking equipment is very important Support of Media technology feature sets is mandatory (e.g. 1588 PTPv2)
- Consider that each network domain will most likely have their own timing hierarchy
- FPGA technology provides the basis for the lowest jitter, lowest latency and highest throughput

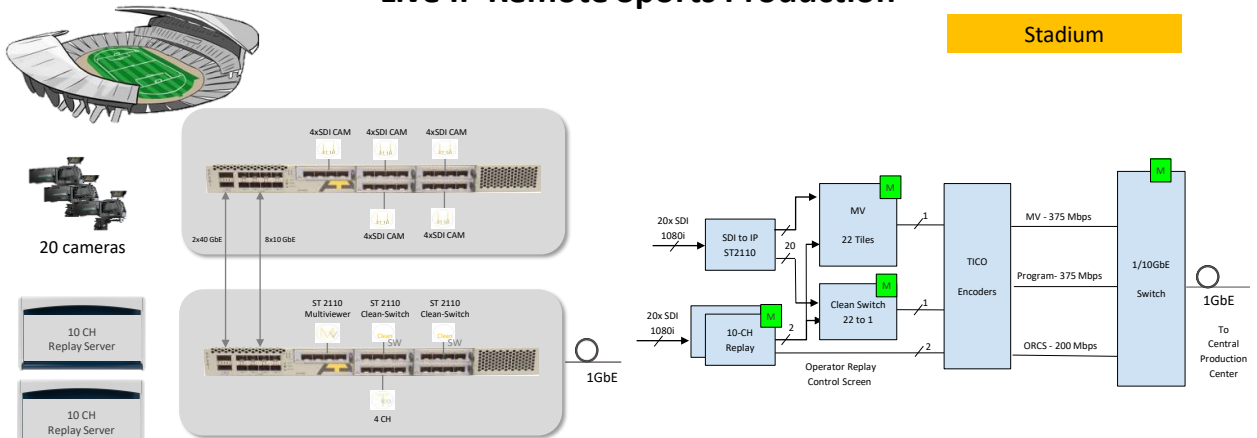




### From Seconds to Milliseconds



### Live IP Remote Sports Production





## Transition to Virtualization – that's what really matters

- SMPTE 2022, and especially SMPTE 2110, AMWA NMOS standards are the perfect stepping stones
- Low-latency (msec's), Live (remote) production and distribution:
  - Virtualized FPGA compute infrastructure
  - Direct attached, wire speed ethernet to the FPGA
  - IP timing and QoS are important design choices
- Agility:
  - A complete library of Broadcast function Apps
  - Floating and metered licenses
- In use:
  - Live IP and Virtualized Premium Sports Remote production network

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## Microservices-based and native-IP (Remote) Live Production

●Ultimate architecture●Here today!!!

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