# Remote production unlimited?

## Approaches for coping with bandwidth limitations

Erling Hedkvist – SVP Networked Audio Video

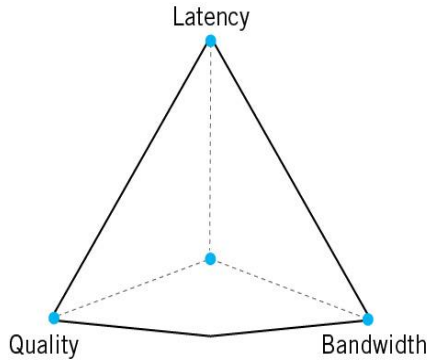
Lawo

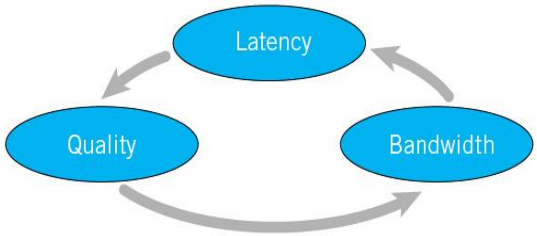


**Doing more with less** has become a mantra in today's broadcast operations.

- Higher utilization
- Resolution and format boosts: more data need to be transported
- Users expect agile, scalable, multi-purpose solutions

IP SHOWCASE THEATRE AT IBC2019 : 13–17 SEPT 2019






Codec must allow for:

- Multiple encoding and decoding passes
- Low latency

Mezzanine compression ratios typically range from 2:1 to 10:1

- **J2K:** (J2K Part 1) Most widely used wavelet-based codec. Royalty free
- **VC-2:** (Dirac) Lightweight mezzanine codec developed by BBC. Royalty free
- **Tico:** Lightweight mezzanine codec from intoPIX
- **JPEG XS**: A new JPEG standard from Fraunhofer and intoPIX
- **HT-J2K**: (J2K Part 15) Based on JPEG 2000. Royalty free

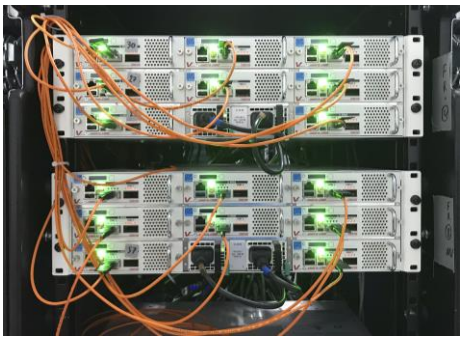


The next logical step for broadcast production equipment:

1. IP networking of all devices
2. Software-definable processing blades
3. Blades become “containers” or “nodes”,
   i.e. processing clusters

Cluster: a group of processing units that work together towards a common goal

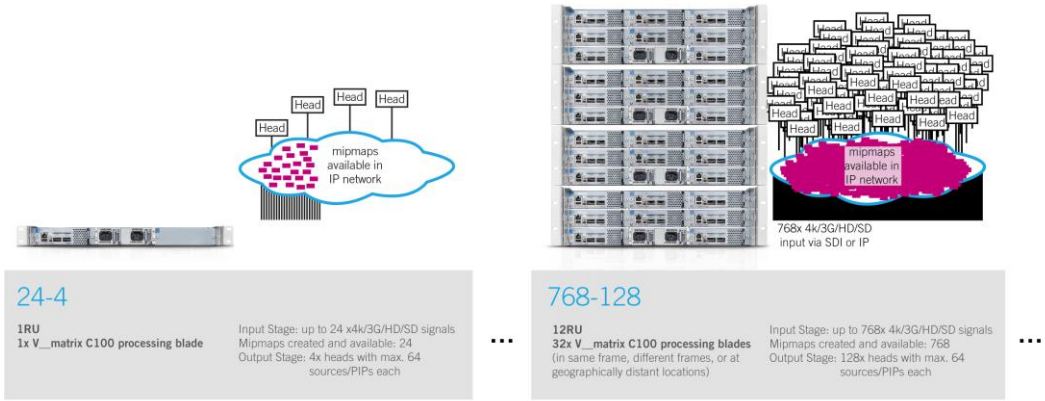
- Defined amount of processing instances selected by user
- One processing unit = master, all others = slaves
- Any slave takes over from a defective one
- Master is automatically replaced when necessary





- Replaceable instances perform a given task. Users only care about aggregate output
- Inherently self-healing
- Ability to easily scale up/down by adding/removing capacity
- Ability to prioritize: highest availability for important results
- Load balancing
- Easy management via master (single point of contact)
- Freely mix and match interface speeds (10, 25, 40, 50, 100…)

Example: Lawo V__matrix vm_dmv distributed multiviewer application






The open standards-based IP technology employed allows cluster members to be:

- Co-located on-campus and/or next to one another
- Distributed over multiple sites and accessed via WAN

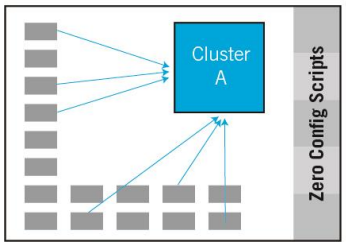
Responsible users: allocate processing units according to the **m+n** principle:

m: number of units required for a given task

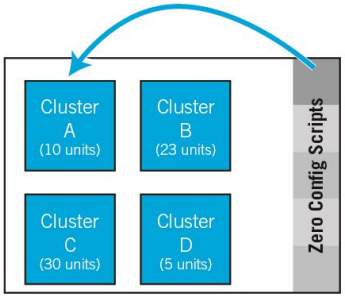
n: number of spare units set aside for redundancy purposes.



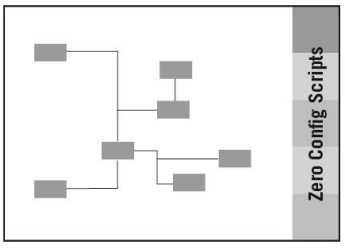
Processing units are allocated to a cluster




Task assigned to a cluster




Process of the configuration (can be edited)



Video compression + distributed processing = Remote production unlimited?




# Thank you

Erling Hedkvist, Lawo
erling.hedkvist@lawo.com

Thank you to our Media Partners