



# Usus Modernus Pandectarum

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# About the title...

- Around year 530 Emperor Justinianus I ordered the roman laws to be written down
- Law came from Emperor, commenting forbidden
- Around year 1000 the glossators started making comments in the glossary...
- And finally around year 1700 people started interpreting the law in a modern way
- Fascinating similarities to eVLBI



# We are still governed by tape-VLBI constraints

- The DARs have limited number of basebands
- Then the data must be received by a tape recorder-like instrument
- Then the huge bandwidth must be transferred in one high-speed stream
- Then it must be played back with a tape recorder-like instrument
- Then it must be correlated with a huge hardware-based correlator



# And the constraints clash with the real world

- Standard computers are almost good enough to record and play back data
- Disks are almost fast enough
- Grid processors are almost fast enough to correlate the data
- Internet is good enough, tcp just cannot cope with long fat pipes
- And after the transfer our data is organized totally wrong for grid-based correlation



## What if...

- Ari Mujunen has shown that reformatting data is possible at  $> 700$  Mbit/s speeds
- A simple modification to the VSIB driver is needed to divide the basebands to several minor devices, one baseband to each
- And then we can run 8 or 16 server programs to send data to different grid computers
- Without using disks at all, they just cause more processor load



## Result:

- No more long fat pipes needed, protocol problems (almost) disappear. Much more easy to transfer 64Mbps than 1Gbps
- Internet sorts our data for us
- Each grid computer has the same baseband from all stations
- 64 Mbits/s from ten stations conveniently fit a 1Gbit/s line, no bottlenecks there



# Future of eVLBI looks even brighter

- Digital backends have capability to send packets directly to Internet, DBE already has two 10Gbit/s Ethernet connection hardware
- Digital backends have more flexibility in number of channels
- 10Gbit/s Ethernet links becoming more affordable and ubiquitous
  - Just bought one, got it essentially at 1Gbit/s price
- Cell processors are arriving in a few months



# Things to consider: VSI, a solution or a problem?

- Five years ago VSI was a solution facilitating the co-operation of different VLBI systems
- And as a interim solution to connect legacy systems to Internet it is still useful
- But: If the DBE can send the packets more efficiently, why do we want a VSI connection and another computer between it and the Internet?