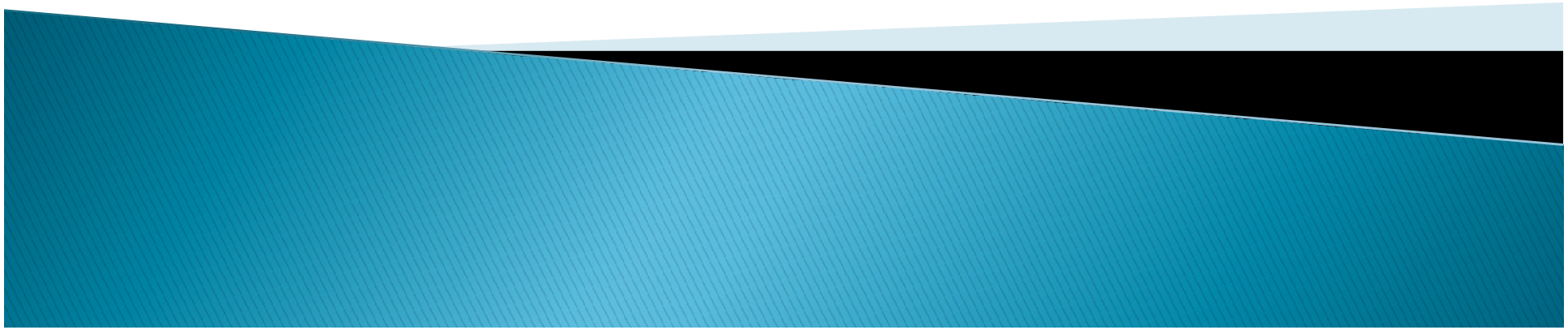
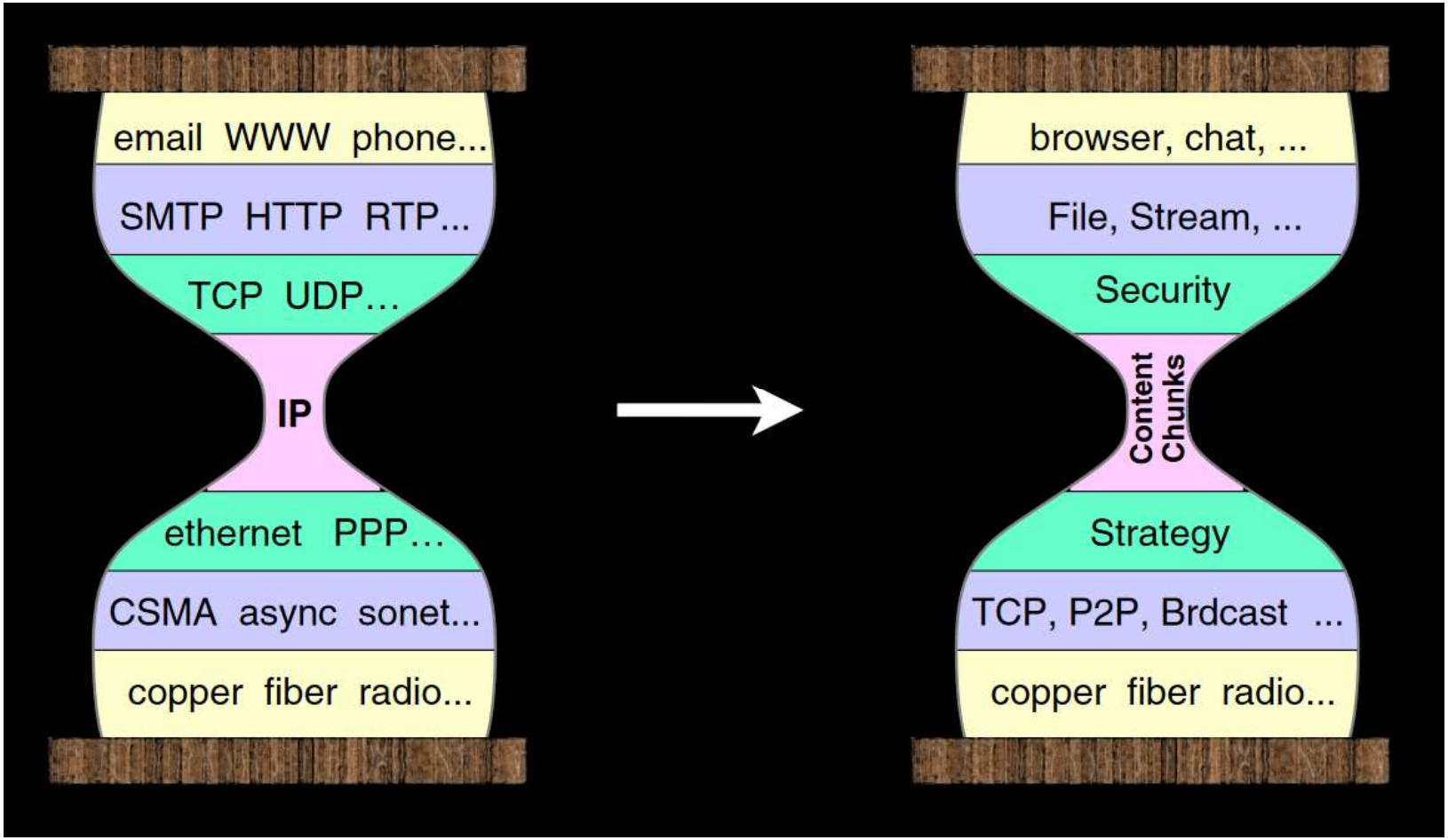
Content-centric Networking (CCN)

Group 1

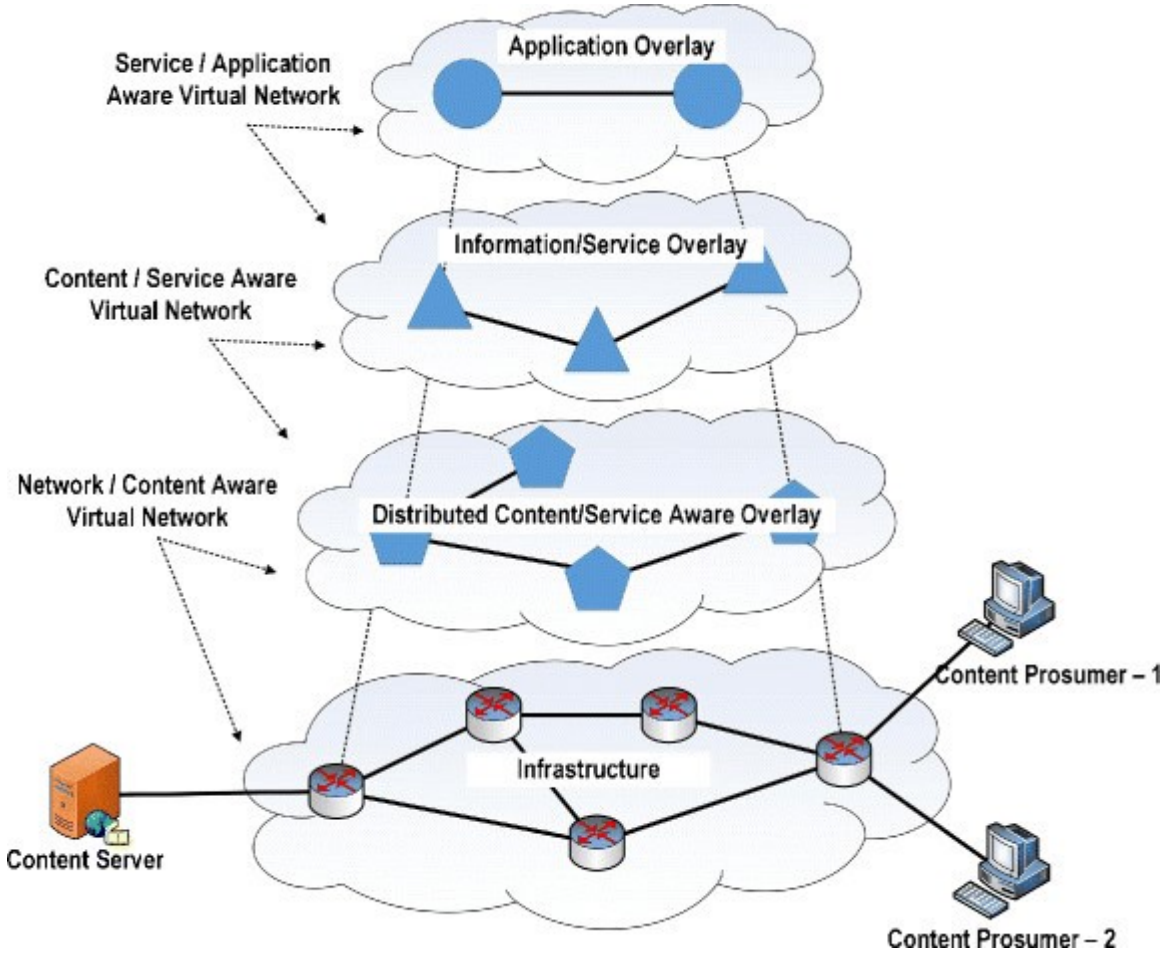


General structure

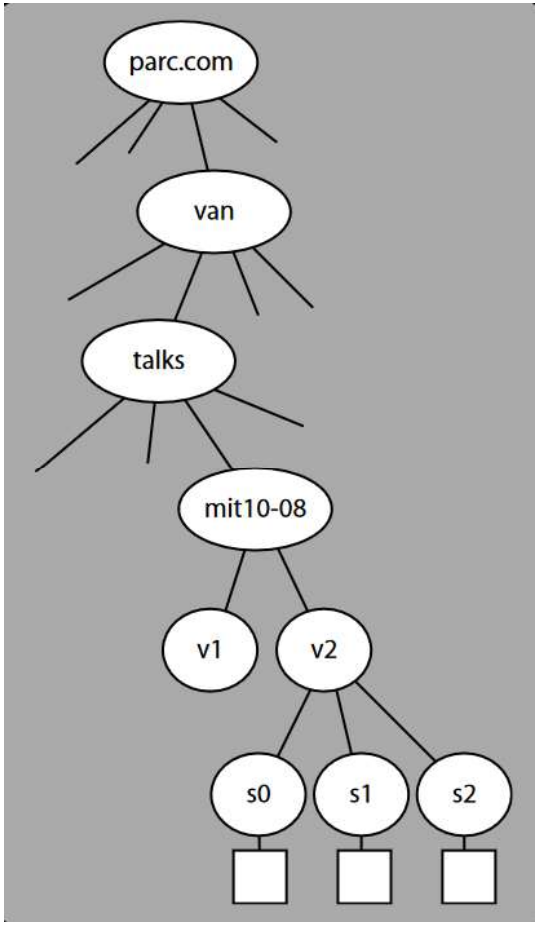


Jacobson et al., 2007

General structure



Hierarchical structure



Next available chunk after s1:

parc.com/van/talks/mit10-08/v2/s1

Conventions:

- name tree child nodes are lexically ordered
- <next> assumed if no relationship specified

App supplied name | Versioning & segmentation | Content or proxy (e.g., SHA256 checksum)

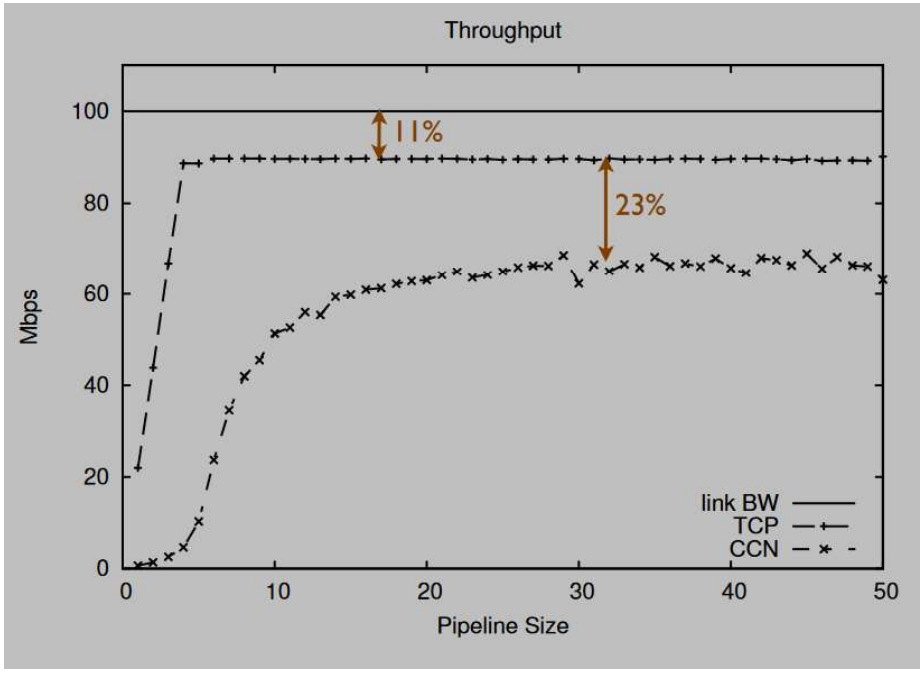
/parc.com/van/cal/417.vcf/v3/s0/0x3fdc96a4...

→ Like NDN (Named Data Networking), CCN uses this type of forwarding, which counteracts the limited availability of IPv4.

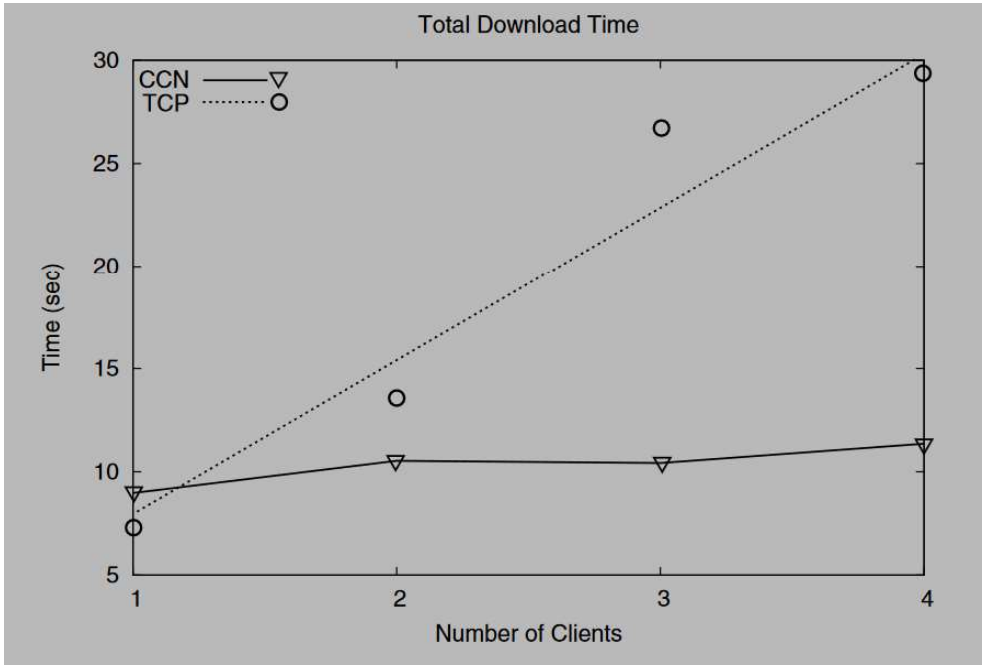
Jacobson et al., 2007,
Ding et al., 2016

Advantages compared to IP

Bulk-data transfer performance comparison



Shared-content performance comparison



Jacobson et al., 2007

Beneficial approaches

- **Security: secure data not communication pipe**
  - Ensure data trust.
  - Guarantees data integrity.
  - Enables verification on data provenance.
- **Flexibility: use names to communicate not IP addresses**
  - CCN Names identify an information collection (not an information container)
  - Name hierarchy indicates membership
  - Same information can have many names
- **Scalability: alows caching, multicast traffic, load balancing, resource planning**
  - CCN and NDN allows data packets to be cached in the router‘s CS (Content Store)
  - Forwards packets based on names rather than addresses (IP address exhaustion)

Ding et al., 2016,
Gür, 2015

References:

- Ding, W., Yan, Z. & Deng, R. (2016) A Survey on Future Internet Security Architectures. IEEE Access. 4: 4374-7393. Available from: https://0-ieeexplore-ieee-org.serlib0.essex.ac.uk/document/7526334#IEEE [Accessed 13 February 2022].

- Jacobson, V., Mosko, M., Smetters, D., & Garcia-Luna-Aceves, J. (2007). Content-centric networking. Whitepaper, Palo Alto Research Center, 2-4. Available from: http://bnrg.cs.berkeley.edu/~randy/Courses/CS294.S13/14.2b.pdf [Accessed 14 February 2022].

- Gür, G. (2015) Modeling and Simulation of Computer Networks and Systems. Science Direct. Available from: https://www.sciencedirect.com/topics/computer-science/centric-content [Accessed 15 February 2022].

- Mundugar, R. (2017) Future Content Centric Internet Architecture. ResearchGate. Available from: https://www.researchgate.net/figure/Future-Content-Centric-Internet-Architecture-29_fig1_309358763 [Accessed 16 February 2022].