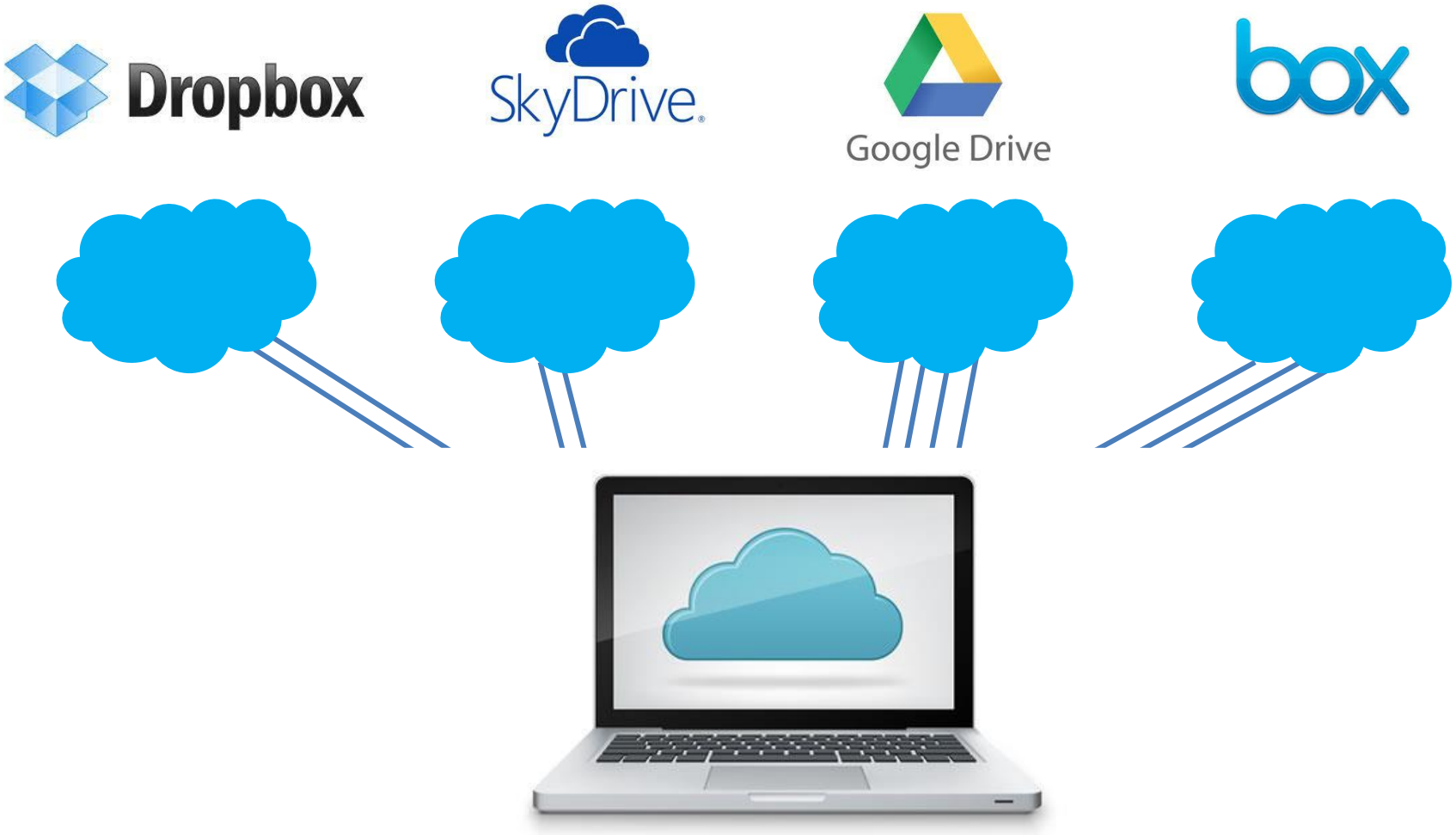
Distributed Storage with RLNC

Frank H.P. Fitzek

Aalborg University / CodeOn / Steinwurf/Phonedeck/?

M. Sipos and F.H.P. Fitzek and D. Lucani and M.V. Pedersen. **Distributed Cloud Storage Using Network Coding.** 2014. in *IEEE Consumer Communication and Networking Conference*.

Over-The-Top Clouds



Benefits of the Over-The-Top

- Reliability in being non dependent on one provider
- Accumulating multiple clouds
- Security and Privacy in strapping information
- Speed-Up in retrieving information

Different Approaches

Scheduling

- Trying to store and retrieve information in the best possible manner
- No coding overhead

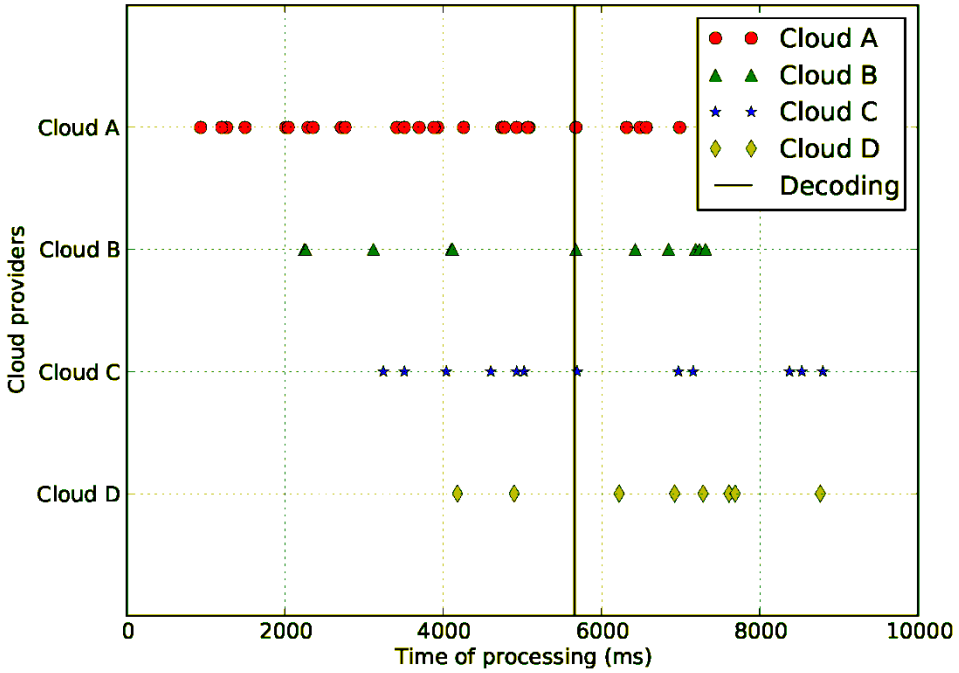
RLNC

- Investing in coding with RLNC (using KODO)
- Storing and retrieving fully encoded information.

Results for Distributed Clouds

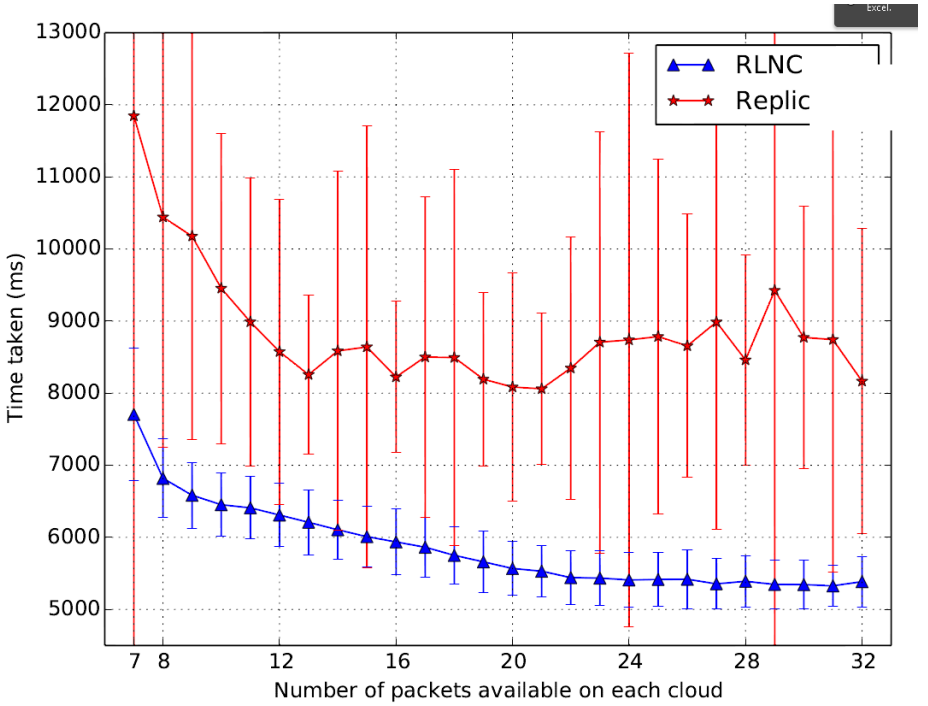
Heterogenity (4 clouds)

- Clouds behave differently



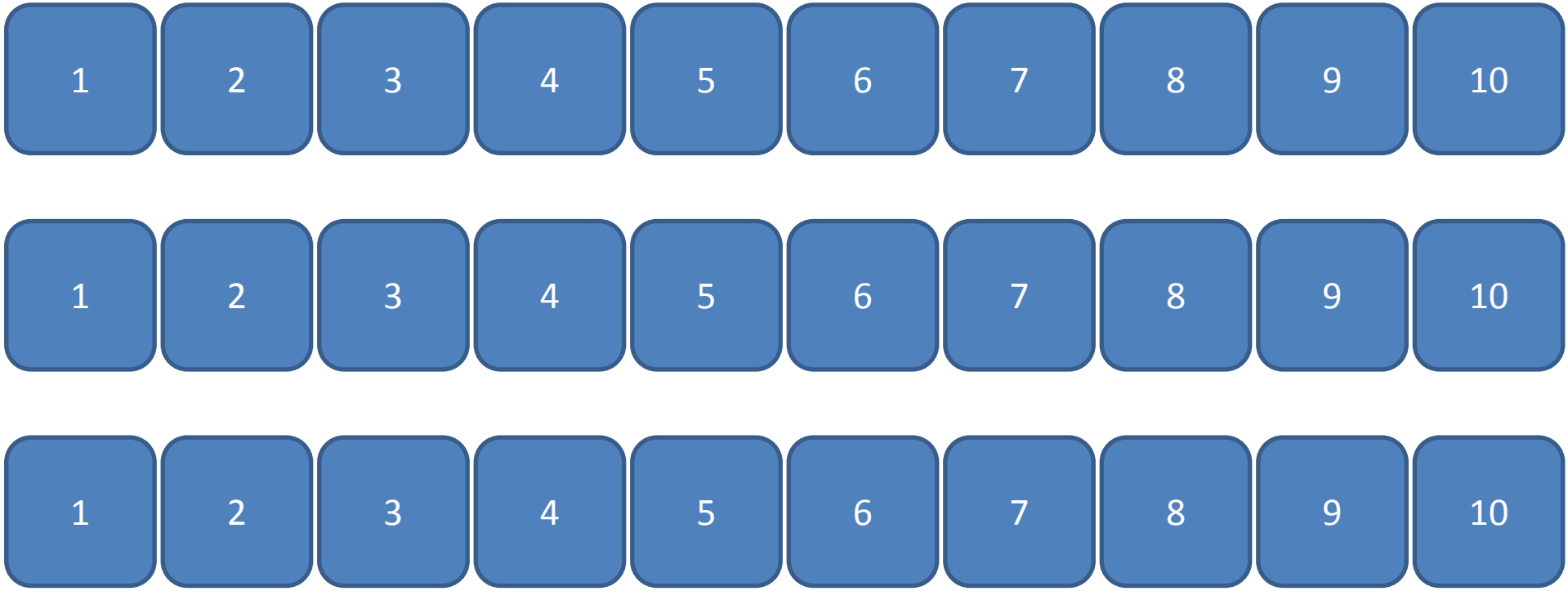
Speed-Up (5 clouds)

- RLNC does not need full degree of freedom



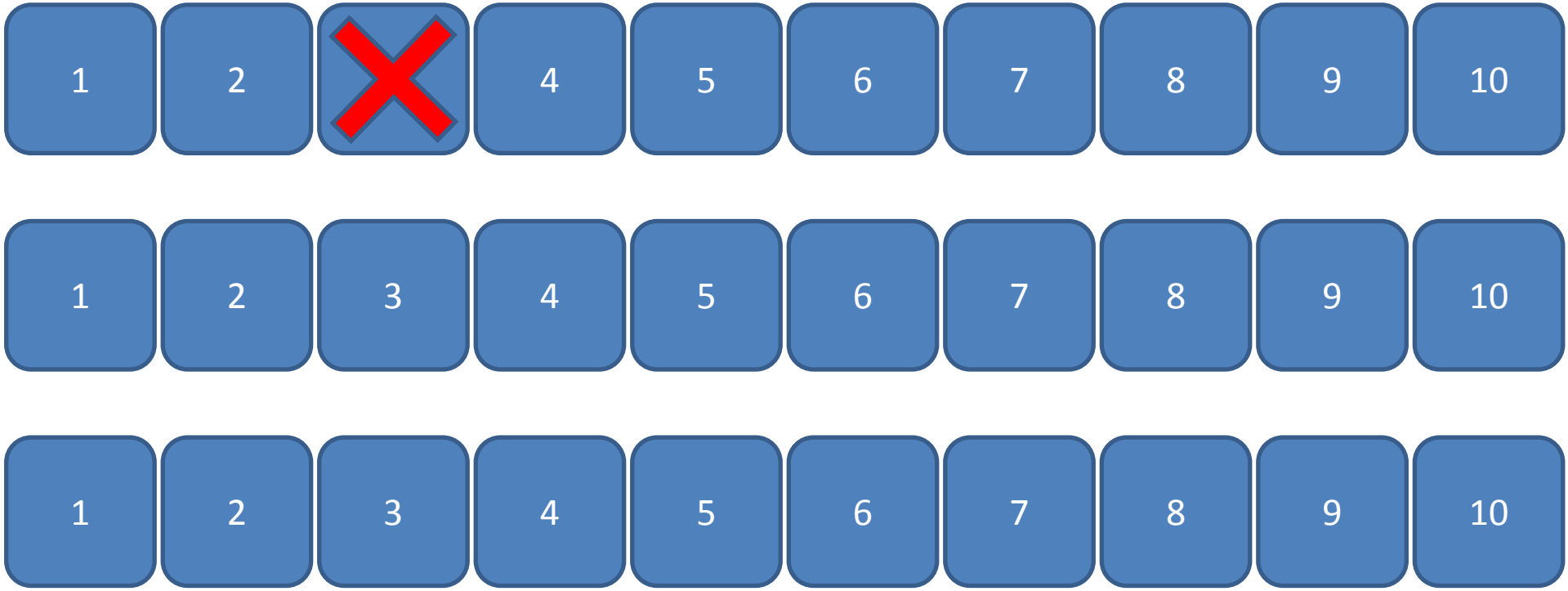
F. Fitzek and T. Toth and A. Szabados and M.V. Pedersen and D. Lucani and M. Sipos and H. Charaf and M. Medard. **Implementation and Performance Evaluation of Distributed Cloud Storage Solutions using Random Linear Network Coding.** 2014. in *IEEE International Conference on Communications - Cooperative and Cognitve Network Workshop - CoCoNet6*

State of the Art



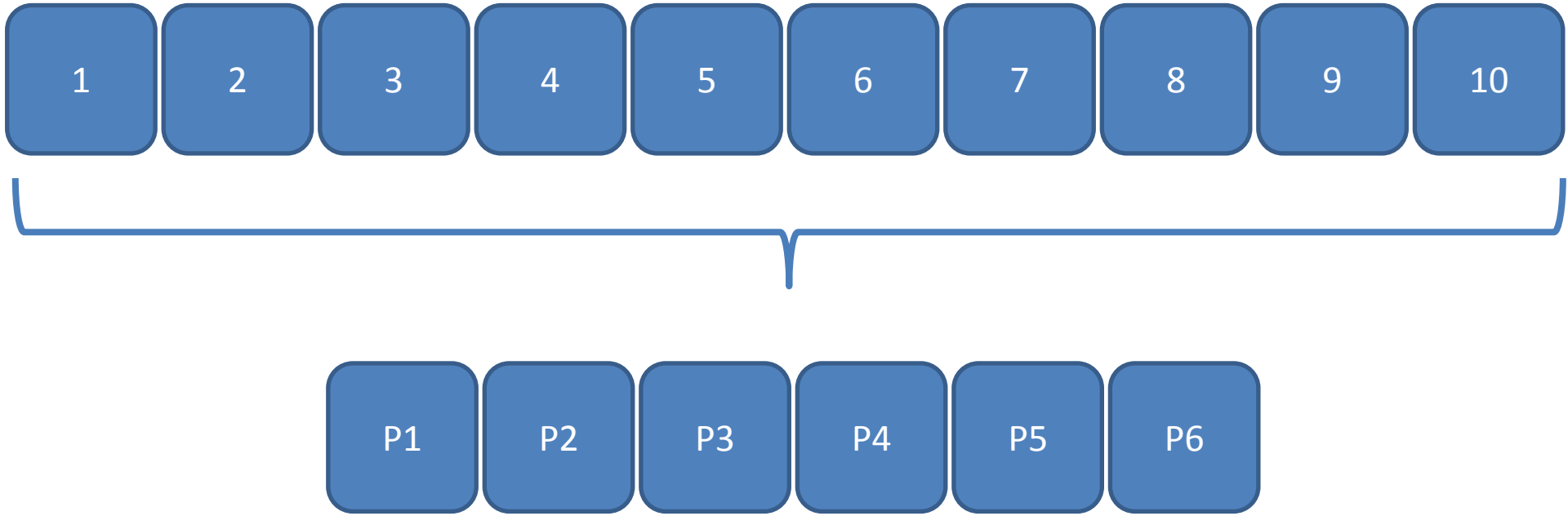
Overhead: 200%

State of the Art



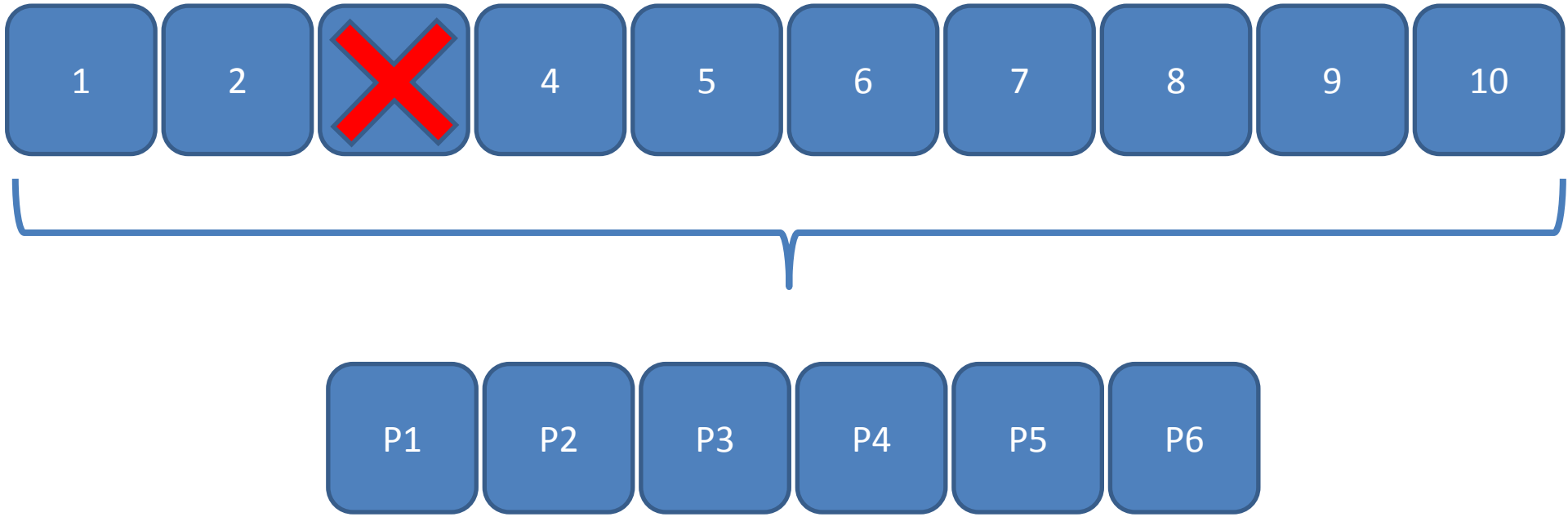
One failure results in one traffic unit

10:6 Code (Facebook)



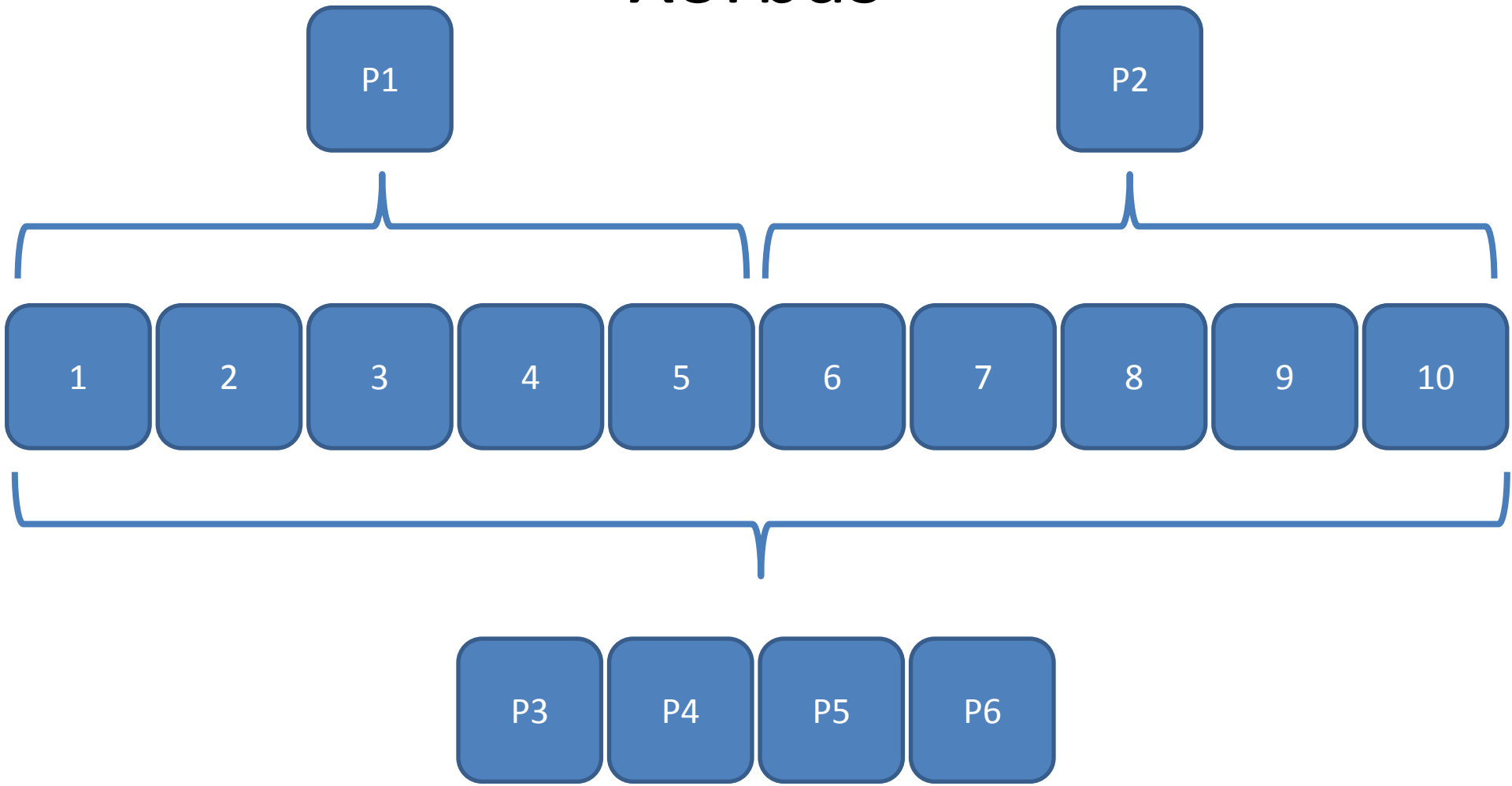
Overhead: 60%

10:6 Code (Facebook)



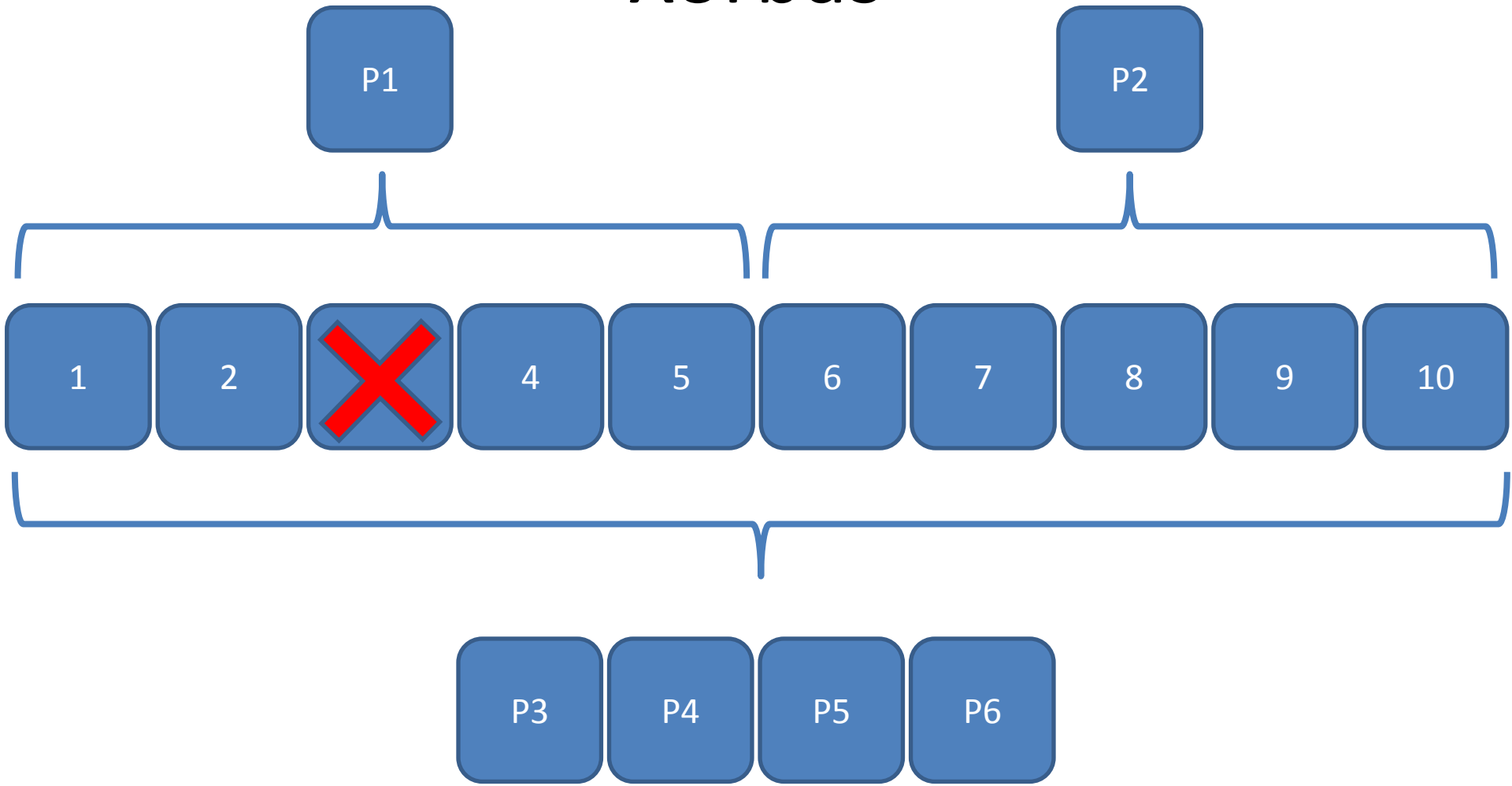
One failure results in 10 traffic units

Xorbas



Overhead: 60%

Xorbas



One failure results in 5 traffic units

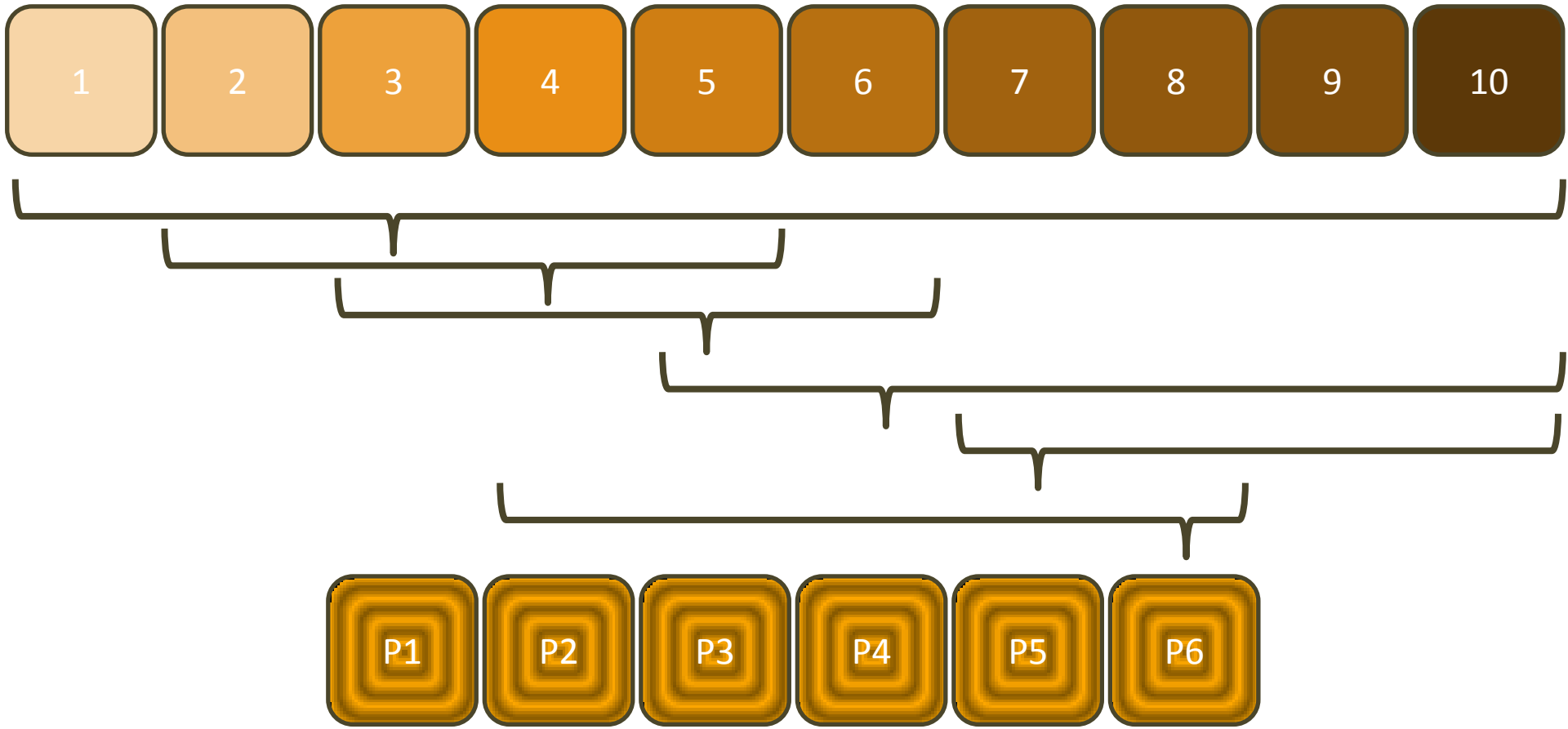
New Challenges in Storing

- So far the structure has been static
- But new use cases require dynamic / versatile codes
  - Edge caching
  - Storage in mobile nodes

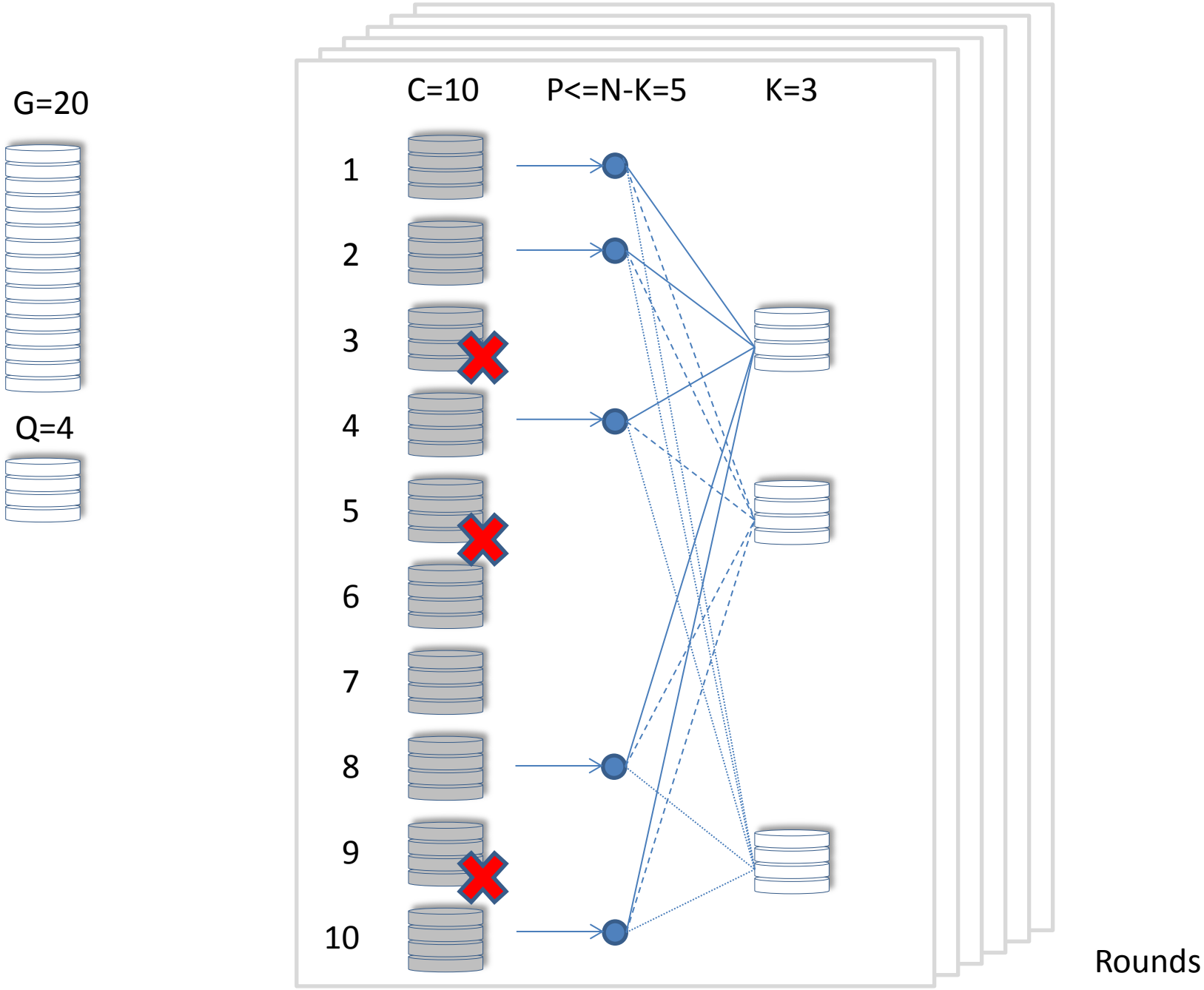
What RLNC can do

- New cloud storages can be filled with available information. Some information might be lost or not available.
- Filling storage on arrival without storing data in memory before decoding.

RLNC

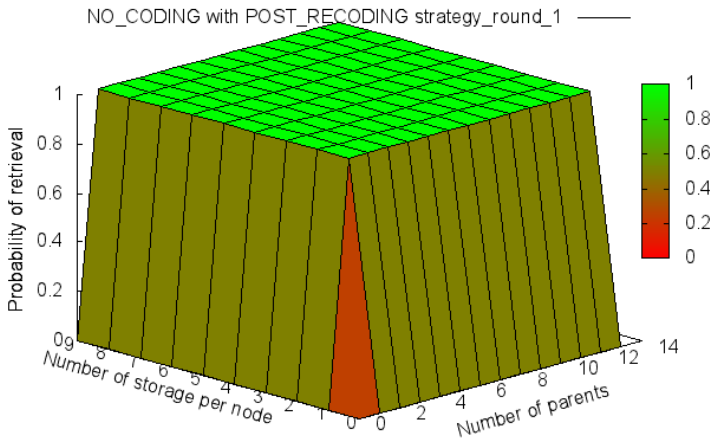


Overhead: scalable

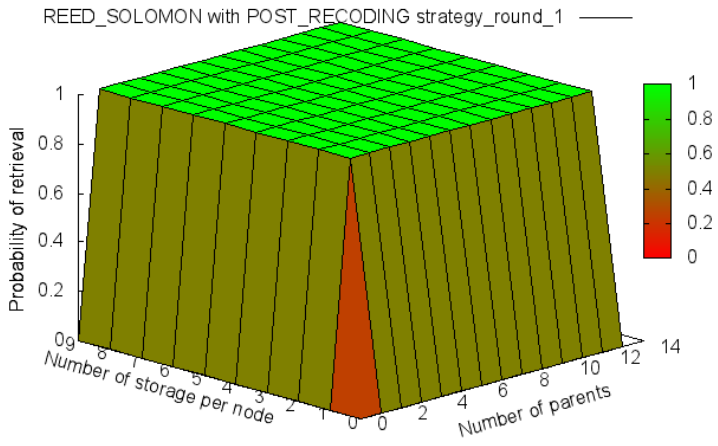

G=20
Q=4
C=10
P<=N-K=5
K=3
1
2
3
4
5
6
7
8
9
10
Rounds

Cloud Migration Results

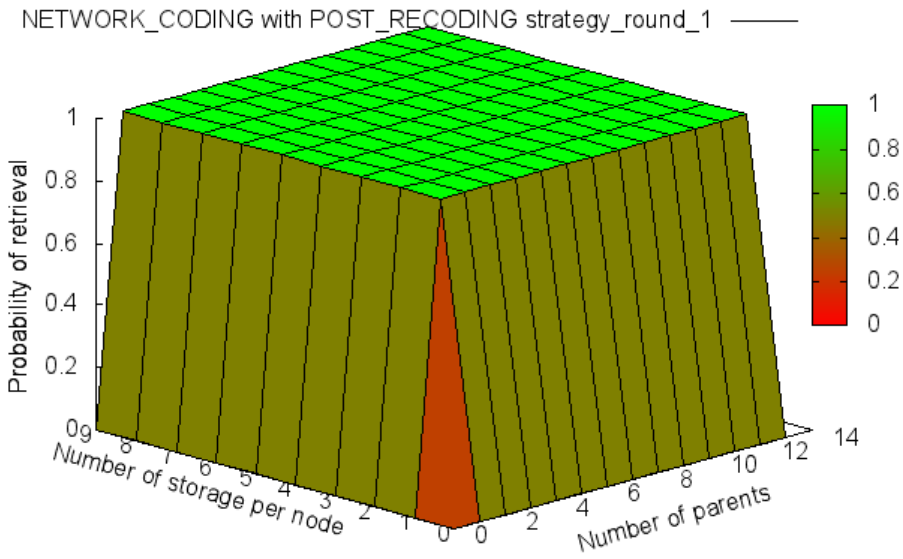
No Coding



RS Coding



Network Coding



chocolate-cloud.cc

COMING SOON ...