ALTO protocol extension: Aggregate network map and cost map into CPID draft-wang-alto-cpid-00.txt

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Objective

- Address ALTO requirements
  - Provides network information to P2P applications to achieve better peer selection
- Use less information exchanged between clients and ALTO server for peer selection
- Make it difficult to get the ISP or P2P privacy
  - ISP can not monitor the matching behaviors of P2P application
  - P2P client is hard to get the full cost info of ISP's network

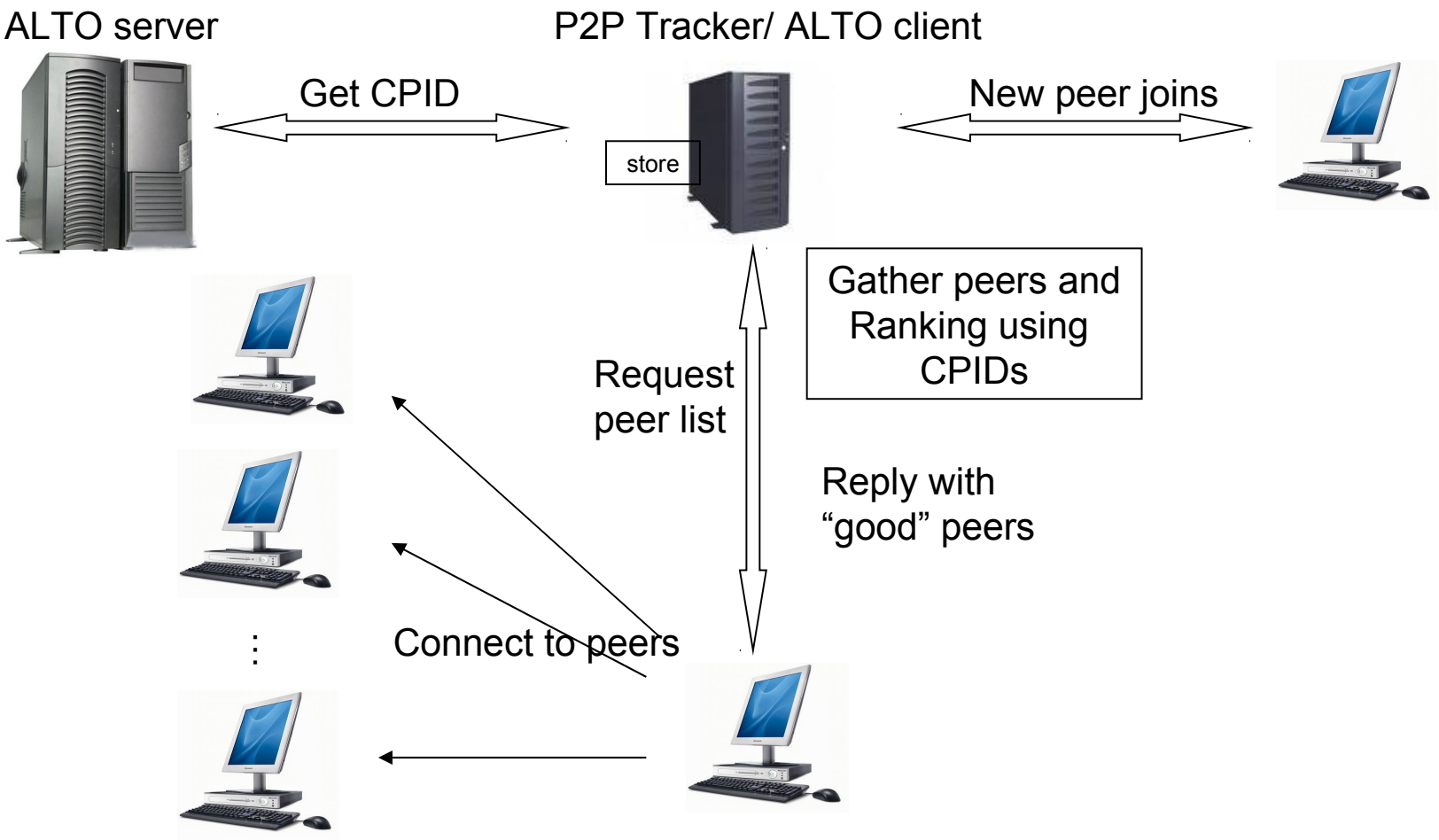
Key points

- CPID
  - A new type of PID
  - Specify a network aggregation, represent a source/destination group
  - Also reflect the costs/weights between peers implicitly
- Network map and path rating in CPID
  - Dissolve topology into CPID: use network map and cost map to construct CPID
  - COST(peer1 ， peer2) = FUNC(CPID1, CPID2)

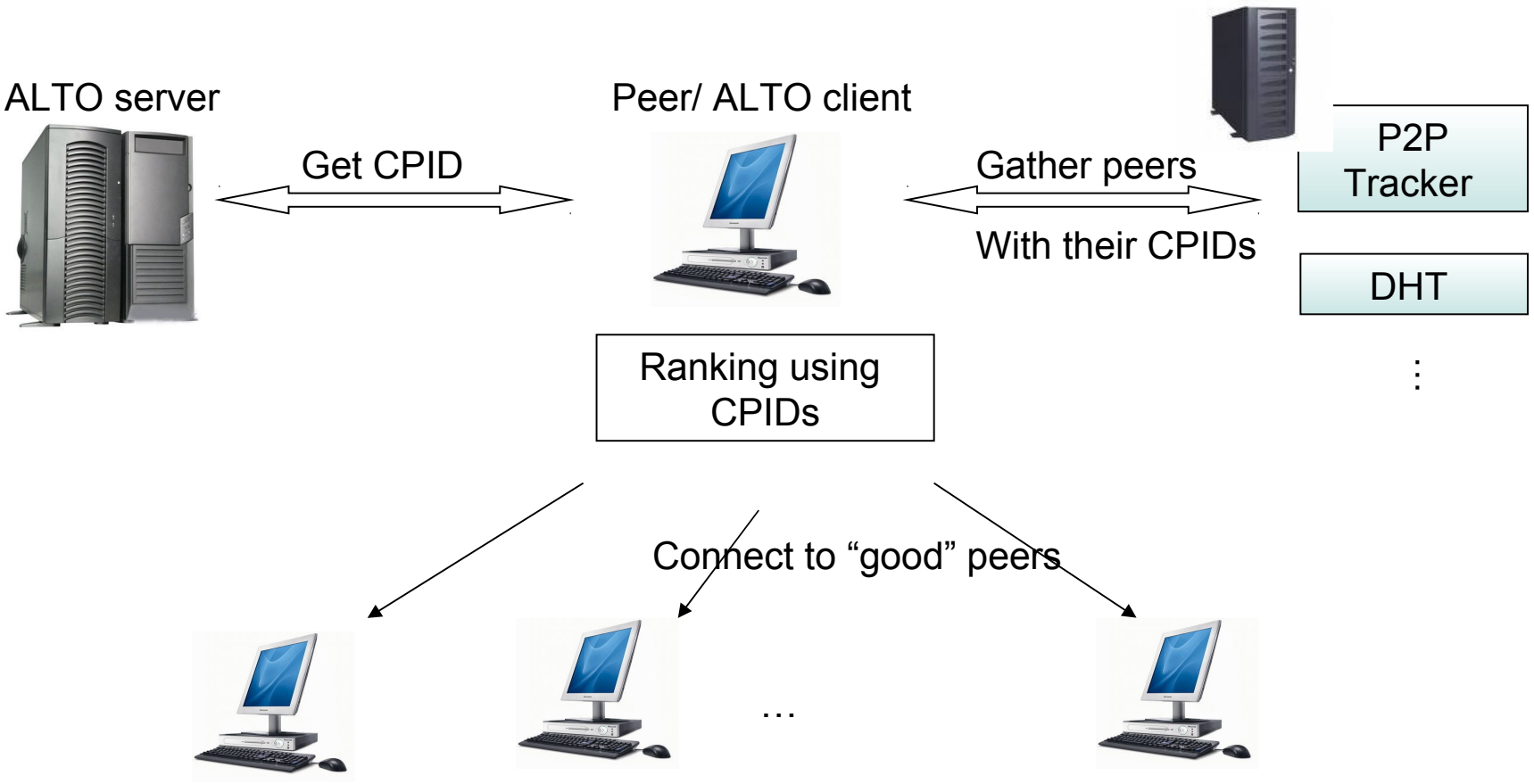
Architecture

- Based on P4P/merged solution
  - Can inherit the architecture, messages, and other mechanisms
- Transfer the guidance only using CPID
  - Get CPID when peer joins for the first time and store locally, or when a former CPID expires, or when triggered by other events
  - Gather the candidates together with their CPIDs
  - Peer selection according to the calculated cost using source and destination CPIDs

Example — ALTO Client Embedded in P2P Tracker



Example — ALTO Client Embedded in P2P Client



Thank you

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CPID construction example

- Procedure
  - Abstract Topology and policy of n groups into an n * n weight matrix
    - w_{ij} is weight or priority from group I to group j
  - Matrix decomposition for n * n weight matrix
    - Many decomposition methods, such as LU decomposition, SVD……
  - CPID combination

$$\begin{pmatrix} w_{11} & w_{12} & \cdots & w_{1n} \\ w_{21} & \ddots & & \vdots \\ \vdots & & \ddots & \vdots \\ w_{n1} & \cdots & \cdots & w_{nn} \end{pmatrix} = \begin{pmatrix} c_{sou11} & c_{sou12} & \cdots & c_{sou1n} \\ c_{sou21} & c_{sou22} & & c_{sou2n} \\ \vdots & & \ddots & \vdots \\ c_{sou\,n1} & c_{sou\,n2} & \cdots & c_{sou\,nn} \end{pmatrix} \times \begin{pmatrix} c_{des11} & c_{des12} & \cdots & c_{des1n} \\ c_{des21} & c_{des22} & & c_{des2n} \\ \vdots & & \ddots & \vdots \\ c_{des\,n1} & c_{des\,n2} & \cdots & c_{des\,nn} \end{pmatrix}$$

CPID for group 1
CPID for group 2
⋮
CPID for group n

- Peer selection criteria
  - Weight from peer in group i to peer in group j: $\sum_{x=1}^{n} c_{sou\,ix} \times c_{des\,xj}$
  - Peer selection according to re-calculated weights
- Dimensionality can be reduced a lot by PCA