(a) Set up and topology

A sends B & C a 36GB-file which consists of six 6-GB blocks (6 × 📄)

DC *A* — **6**GB/s → Server *b* (DC *B*) — **3**GB/s → DC *C*
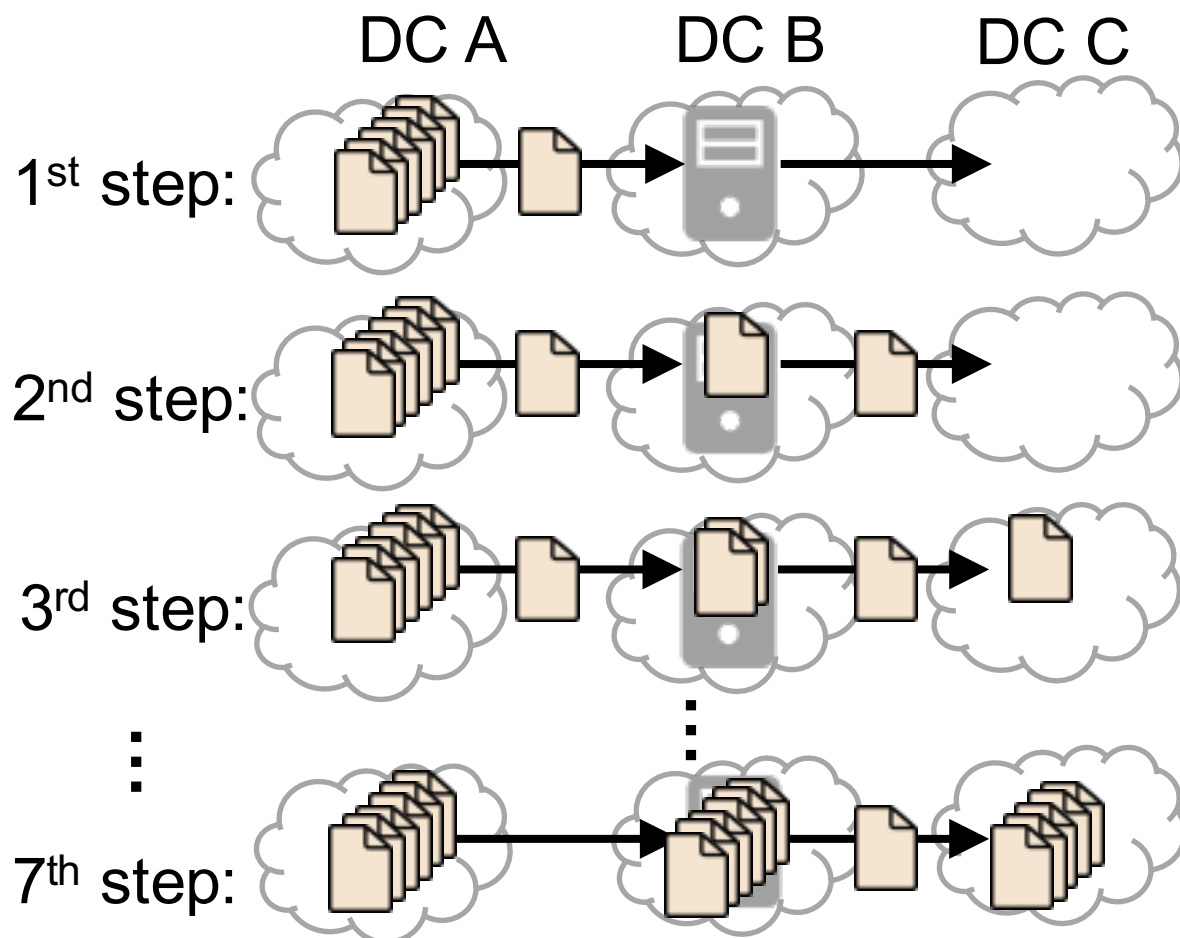
DC *A* — **2**GB/s → DC *C*
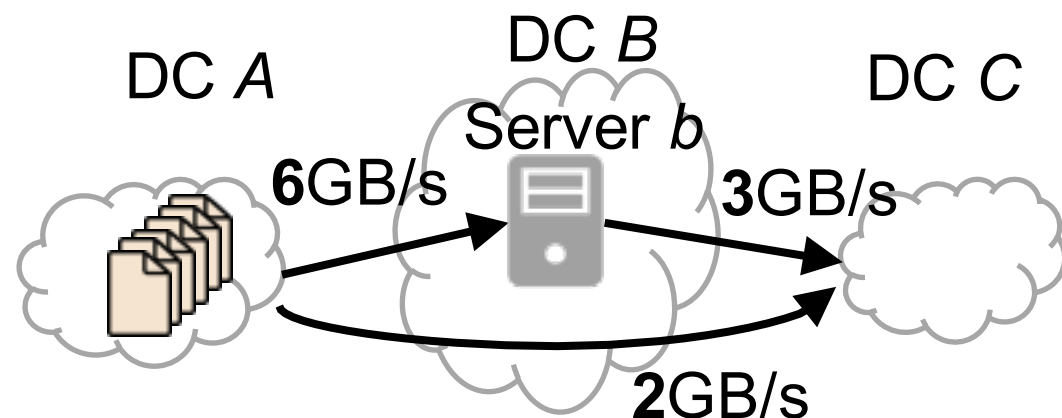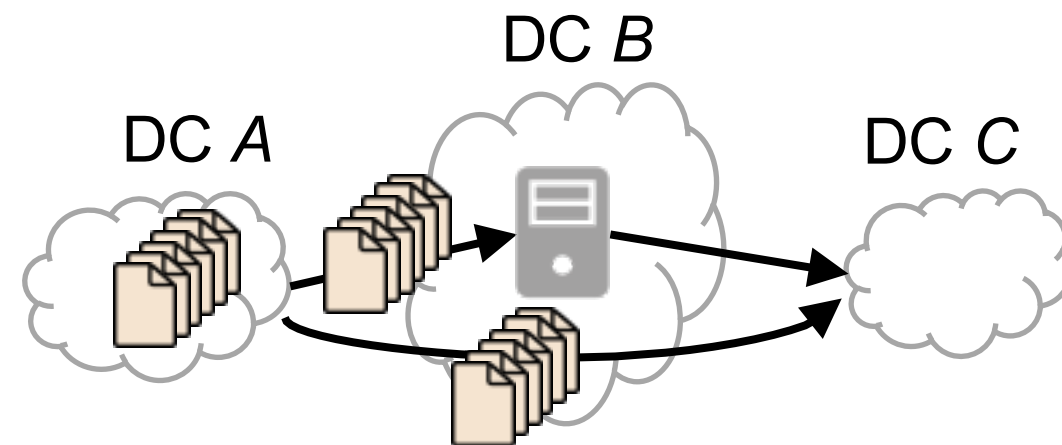
(b) Direct replication: 18 sec

(= *max*(36GB/6GB/s, 36GB/2GB/s))

(c) Chain replication: 13 sec

1st step, 2nd step, 3rd step, ... 7th step: (DC A, DC B, DC C)

(=6GB/6GB/s+6GB/3GB/s+6GB/3GB/s+
6GB/3GB/s+6GB/3GB/s+6GB/3GB/s+6GB/3GB/s)

(d) Intelligent overlay: 9 sec

1st step: **3 sec**

= *max*(18GB/6GB/s, 6GB/2GB/s)

2nd step: **6 sec**
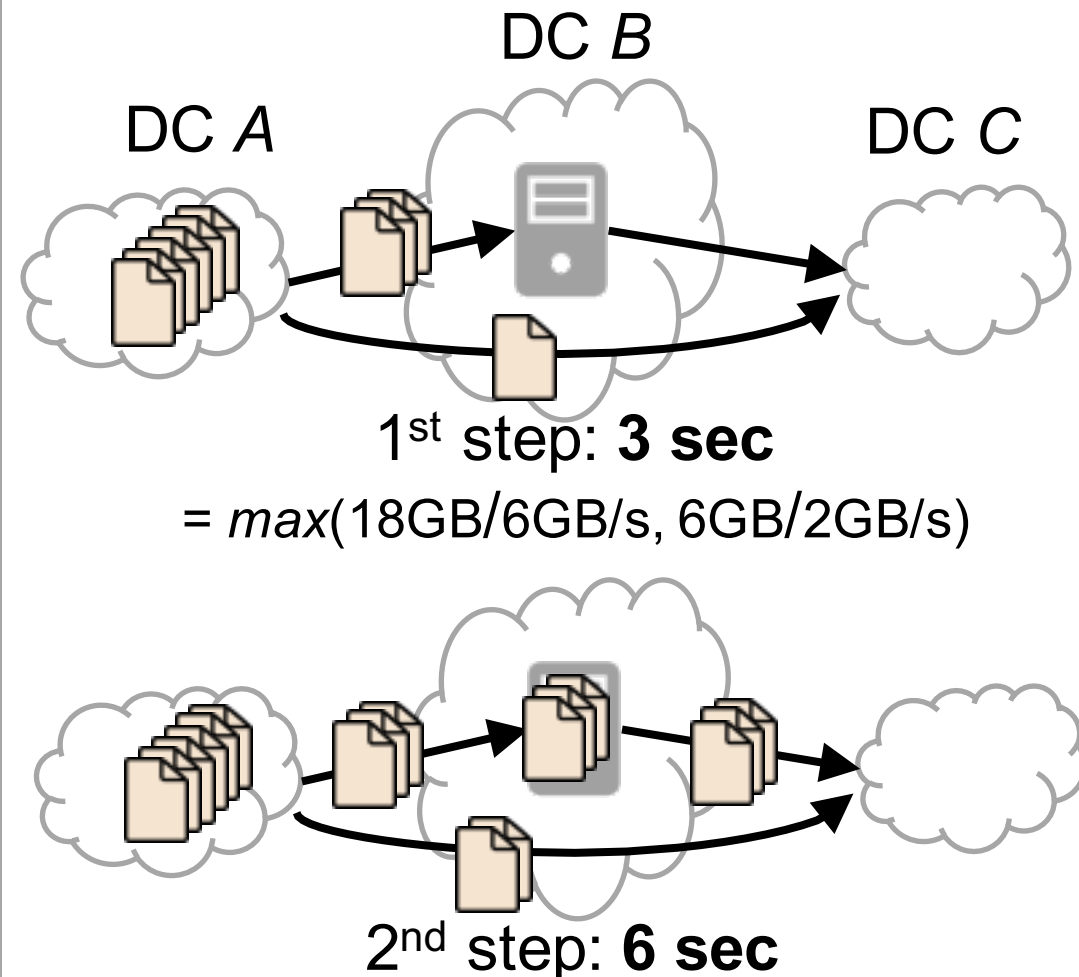
= *max*(18GB/6GB/s, 18GB/3GB/s, 12GB/2GB/s)

(= 3s+6s)