
Circuit-switching networks are the networks that:

(a) transmit user payload as a continuous stream of signals
(b) require path-set up (transmission resource is reserved) before payload transmission starts
(c) do not allow resource sharing (no resource sharing)

Example: telephone networks

(2) What are “virtual-circuit packet-switching networks”?

Virtual-Circuit packet-switching networks are the networks that:

(a) transmit user payload as packets
(b) require path-set up (transmission resource is reserved) before payload transmission starts
(c) allow resource sharing

(3) What are “datagram packet-switching networks”? Mention one example for datagram packet-switching networks.

Datagram packet-switching networks are the networks that:

(a) transmit user payload as packets
(b) do not require path-set up (transmission resource is reserved) before payload transmission starts
(c) allow resource sharing
What are the primary advantages and disadvantages in “datagram packet-switching networks”?

**Advantages:**

1. **Cheap ways to transmit data** (since resource is shared)
2. **No path setup delay** (we can transmit data anytime)

**Disadvantages:**

1. **Best-effort service** (packets can be dropped, no guaranteed transmission speed)
2. **Slow transmission** (each router on a path performs routing for every packet) – packets take longer time before they reach their destinations

Complete the following table that compares circuit switching networks, packet switching networks, and virtual circuit networks.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Circuit-Switching</th>
<th>Virtual Circuit</th>
<th>Datagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>No overhead after TX starts?</td>
<td>NO 📊</td>
<td>NO 📊</td>
<td>YES 📊</td>
</tr>
<tr>
<td>Routing delay?</td>
<td>NO 📊</td>
<td>NO 📊</td>
<td>YES 📊</td>
</tr>
<tr>
<td>Guaranteed Tx Bandwidth?</td>
<td>YES 🙁</td>
<td>YES 🙁</td>
<td>NO 🙁</td>
</tr>
<tr>
<td>Advantages</td>
<td>①</td>
<td>②</td>
<td>③</td>
</tr>
<tr>
<td>Disadvantages</td>
<td>④</td>
<td>⑤</td>
<td>⑥</td>
</tr>
<tr>
<td>Applications</td>
<td>⑦</td>
<td>⑧</td>
<td>⑨</td>
</tr>
</tbody>
</table>

**Guaranteed (quality) transmissions**

**Guaranteed (quality) transmissions, shared resource**

**Cheap (shared resource), no path-setup delay**

**Expensive (no resource sharing), path-setup delay**

**path-setup delay**

**Cheap (shared resource), no path setup delay**

② Dedicated networks (telephone, banks)
⑧ High-Quality networks (ATM, frame-relay)
⑨ Low-price networking (the Internet)