Internet Blocking: Part I – A Technical Review

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in collaboration with ***Prof. Dr. Florent Thouvenin, Kento Reutimann***
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Universität Zürich[UZH]

The Internet 1

Blocking and Bypassing 2

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CSG Communication Systems Group

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The Internet – Key Components

- Hosts
  - Wired end-systems

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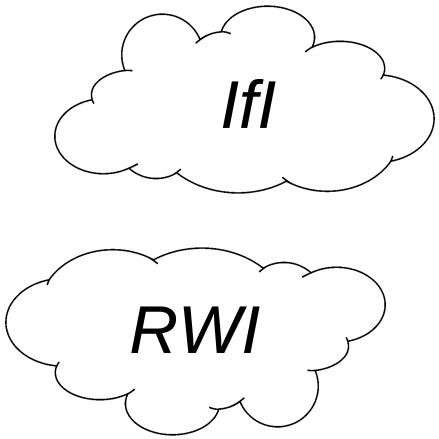
The Internet – Main Structure

Simplified View

- A network of networks, consisting of subnetworks



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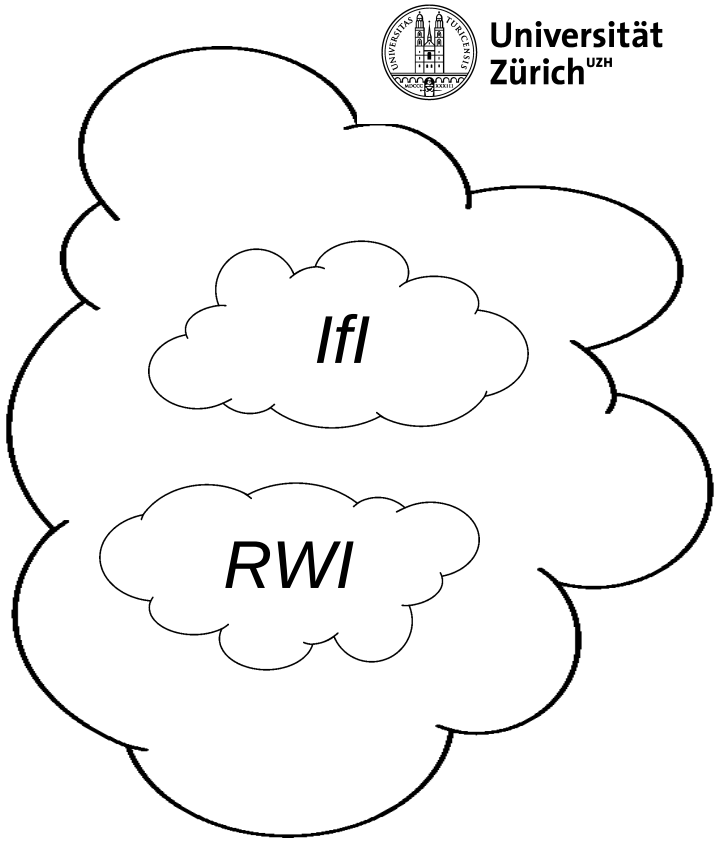

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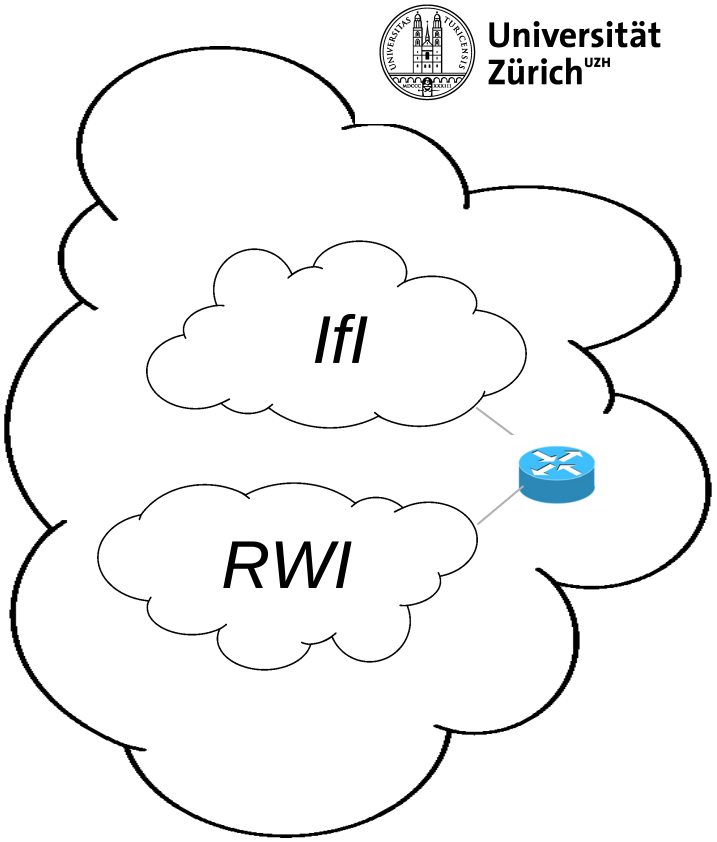

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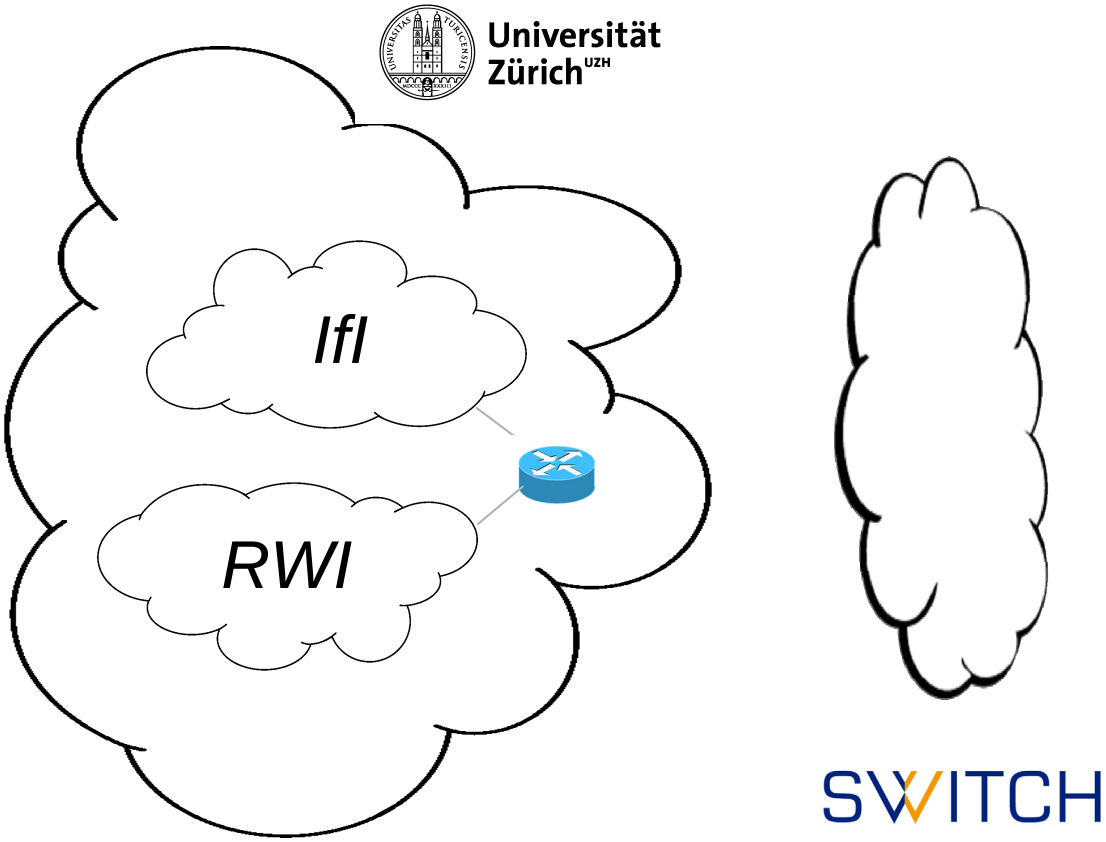

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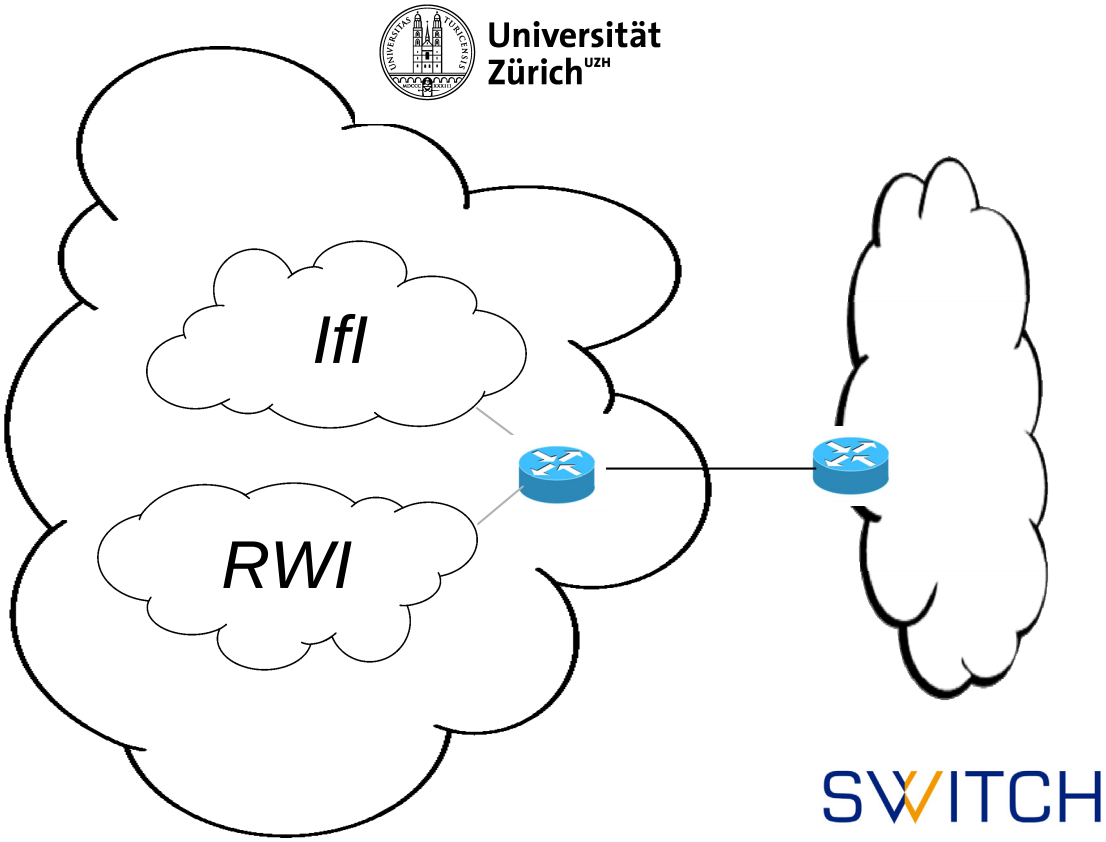

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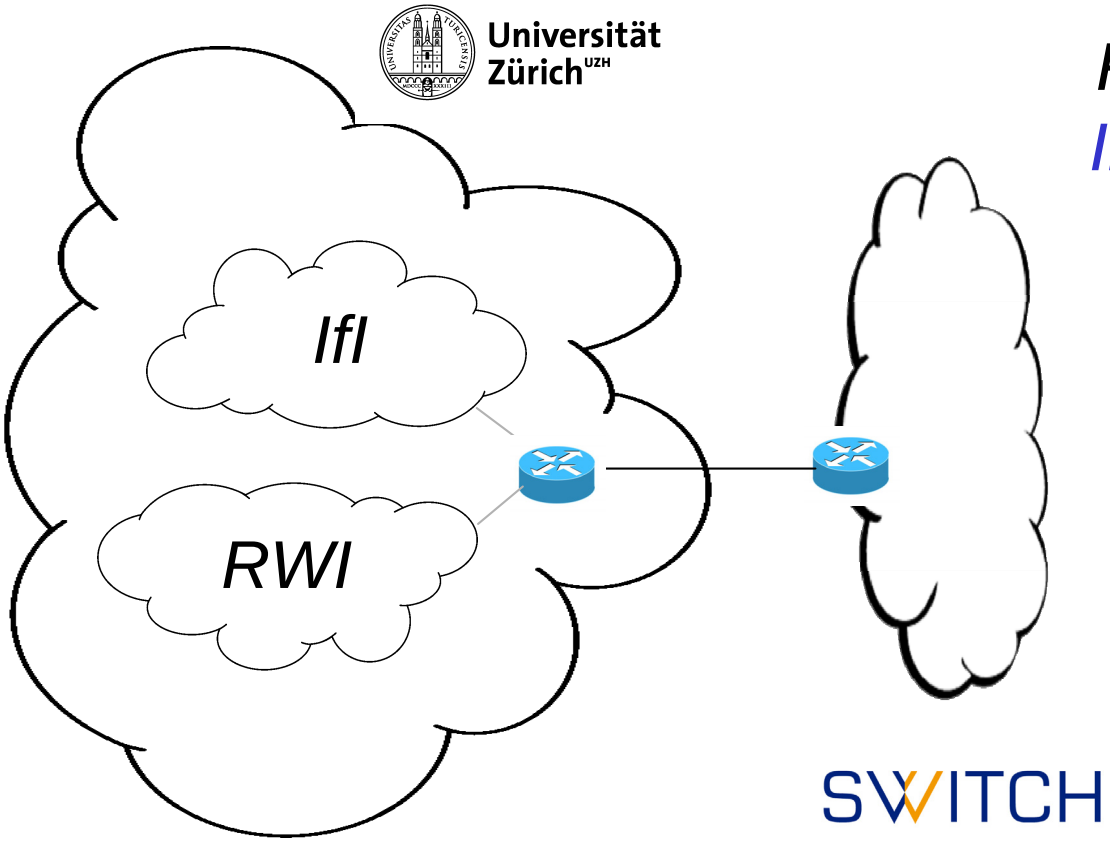

Regional, national, world-wide
Internet Service Provider (ISP)

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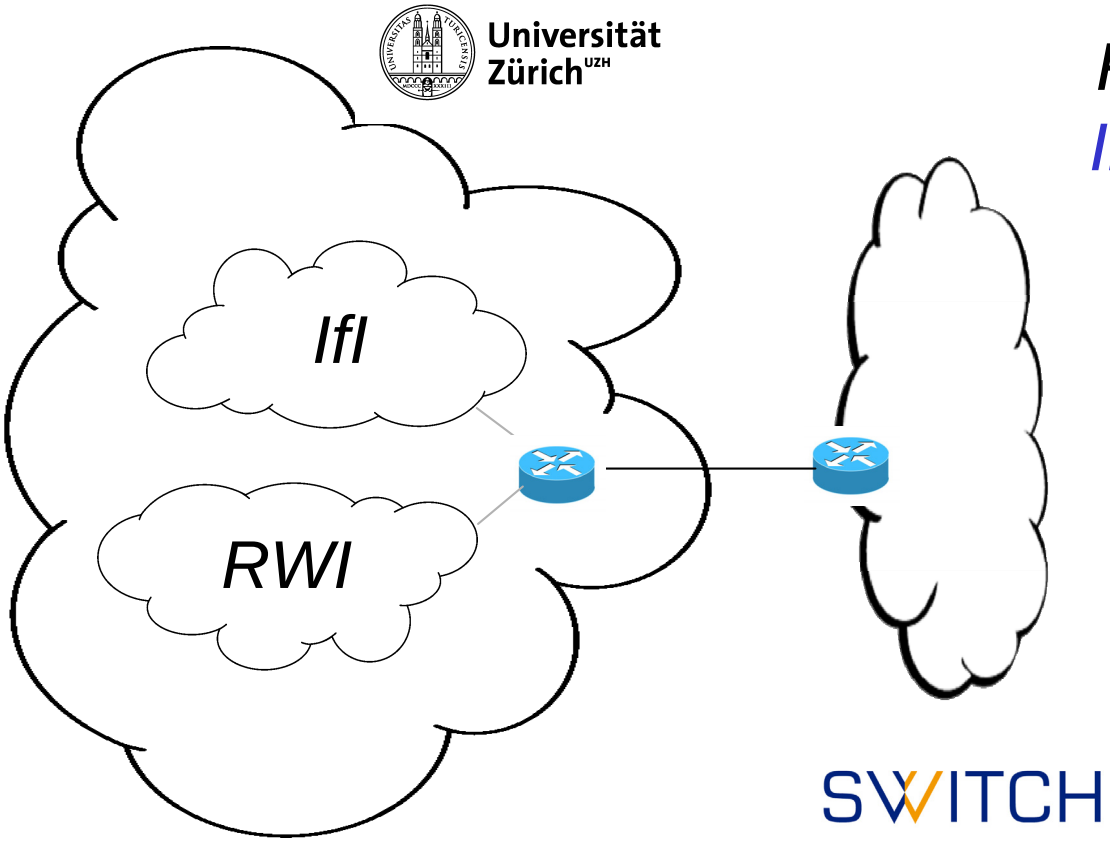

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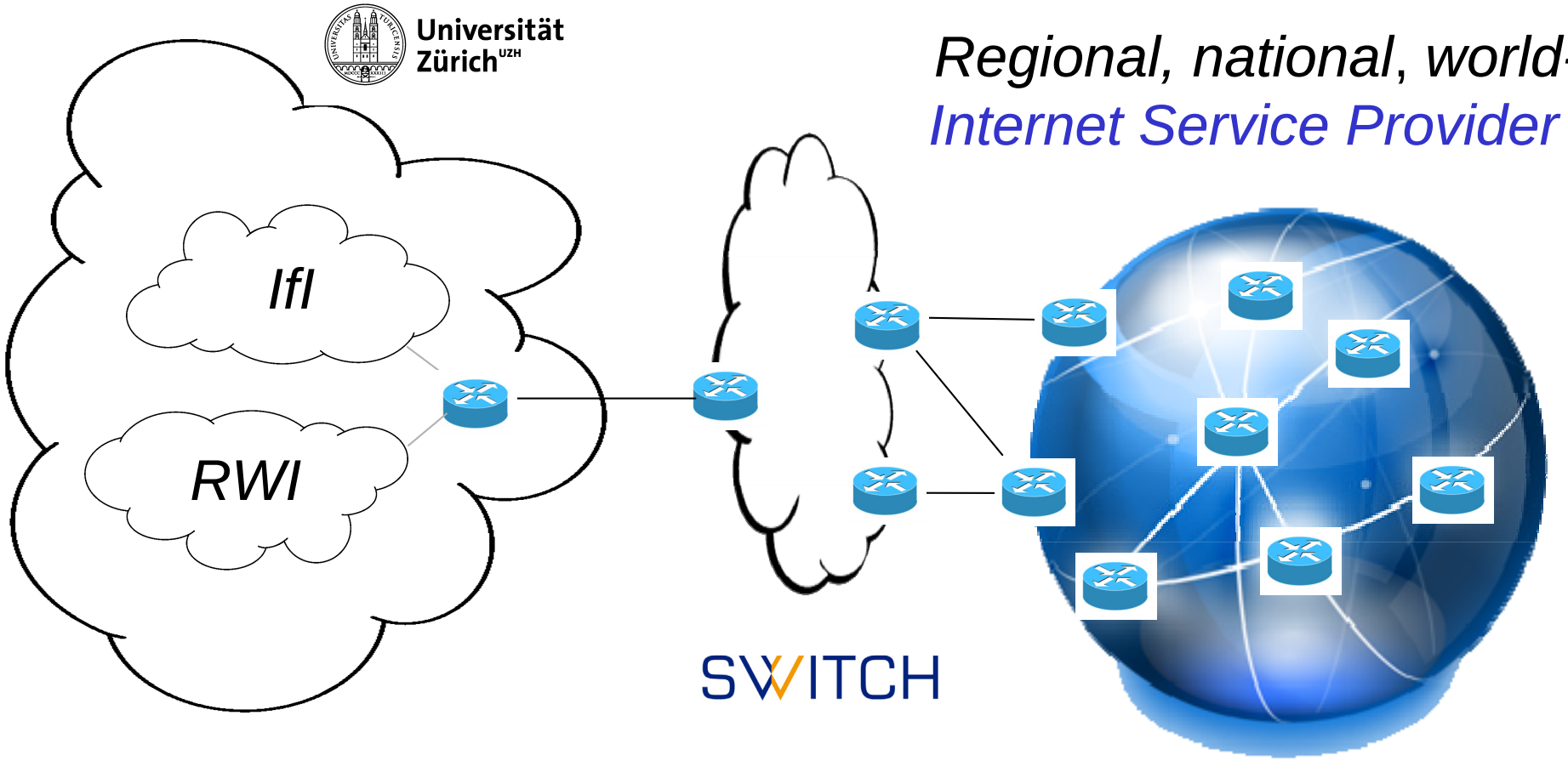

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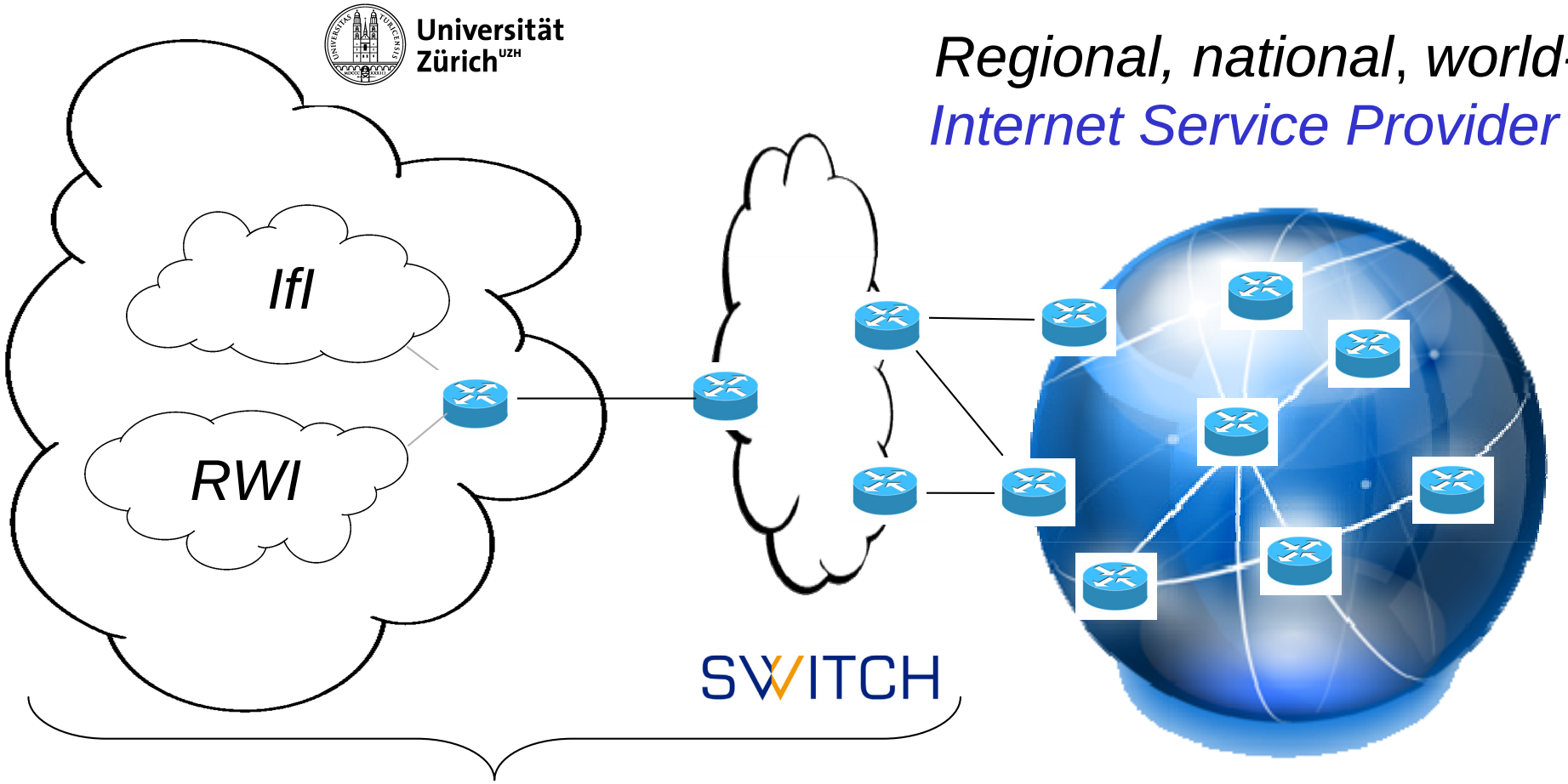

Regional, national, world-wide
Internet Service Provider (ISP)

Autonomous System (AS) with ID AS559

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Addresses and Names

- IP (Internet Protocol) addresses identify hosts & routers
  - Public addresses (example): 130.60.205.7
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- Domain Name System (DNS) hierarchically organizes world-wide and assigns locally names to IP addresses
  - ".ch" Swiss Name Registrar; ".uzh" UZH; "ns1" local machine

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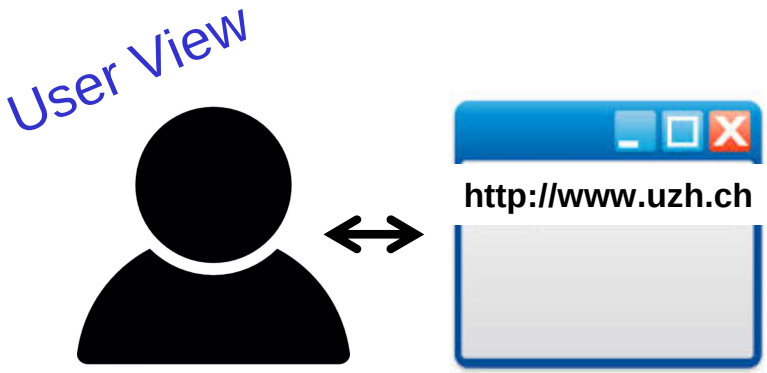
Accessing Information/Services



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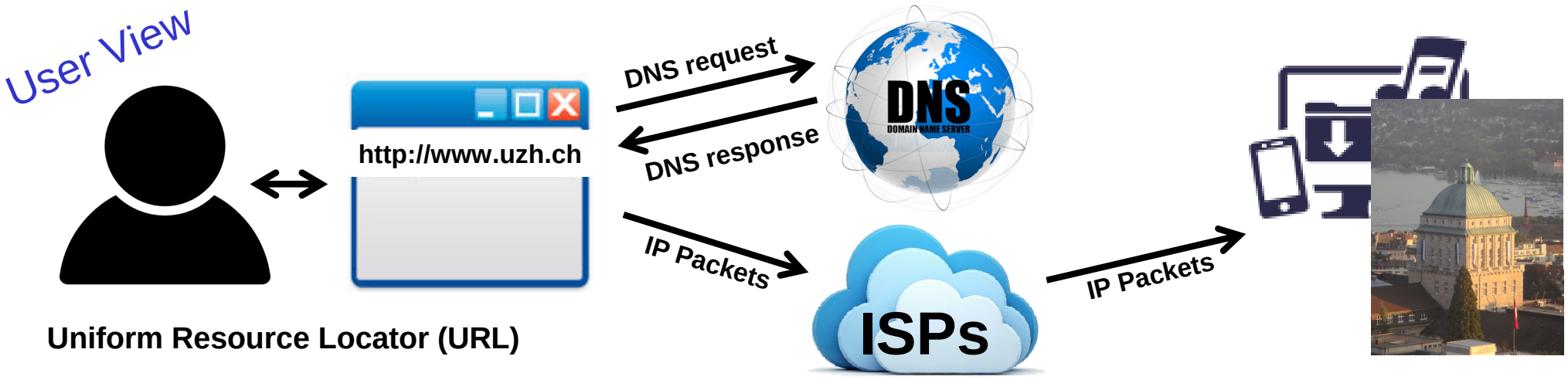

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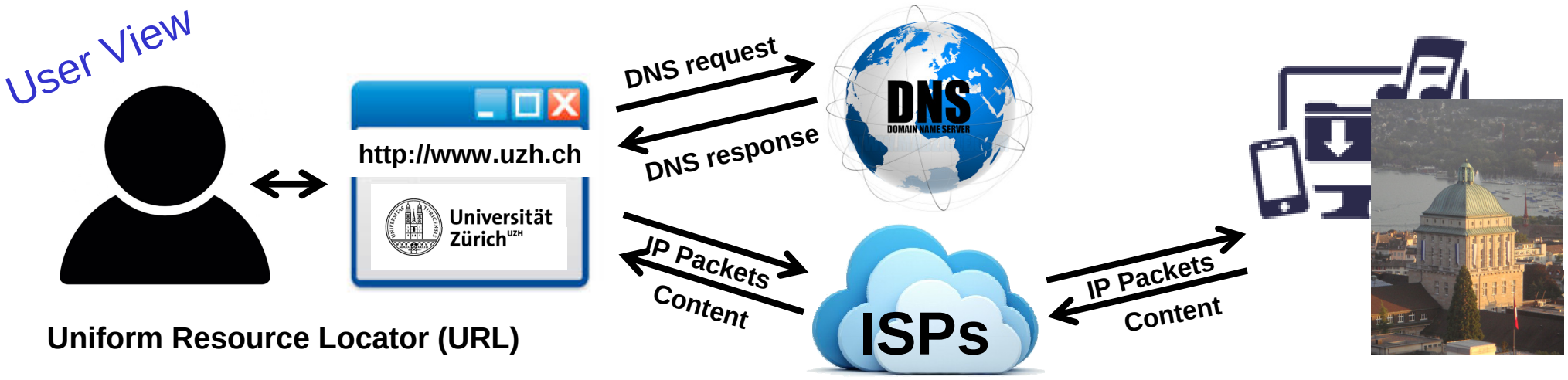

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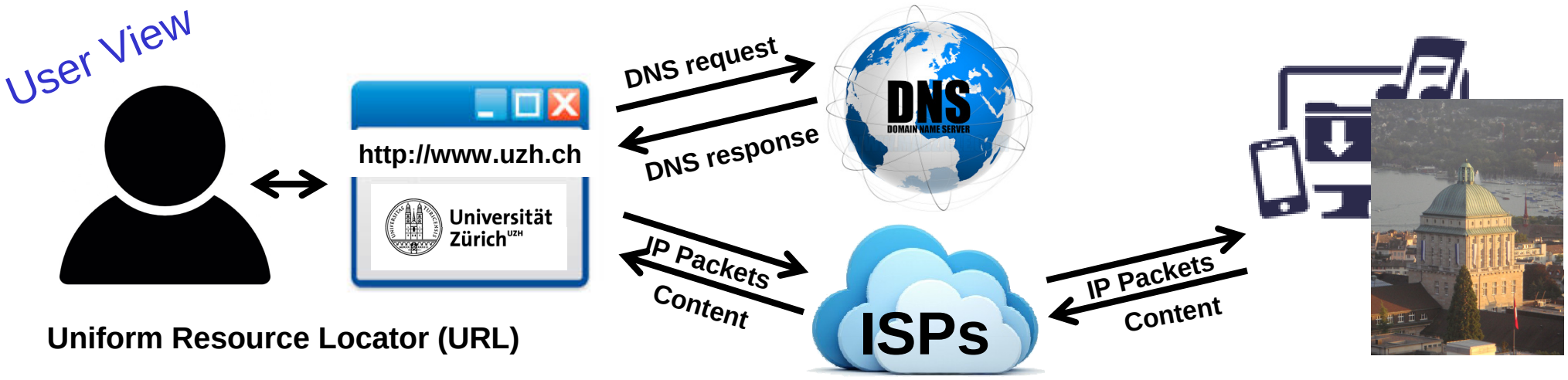

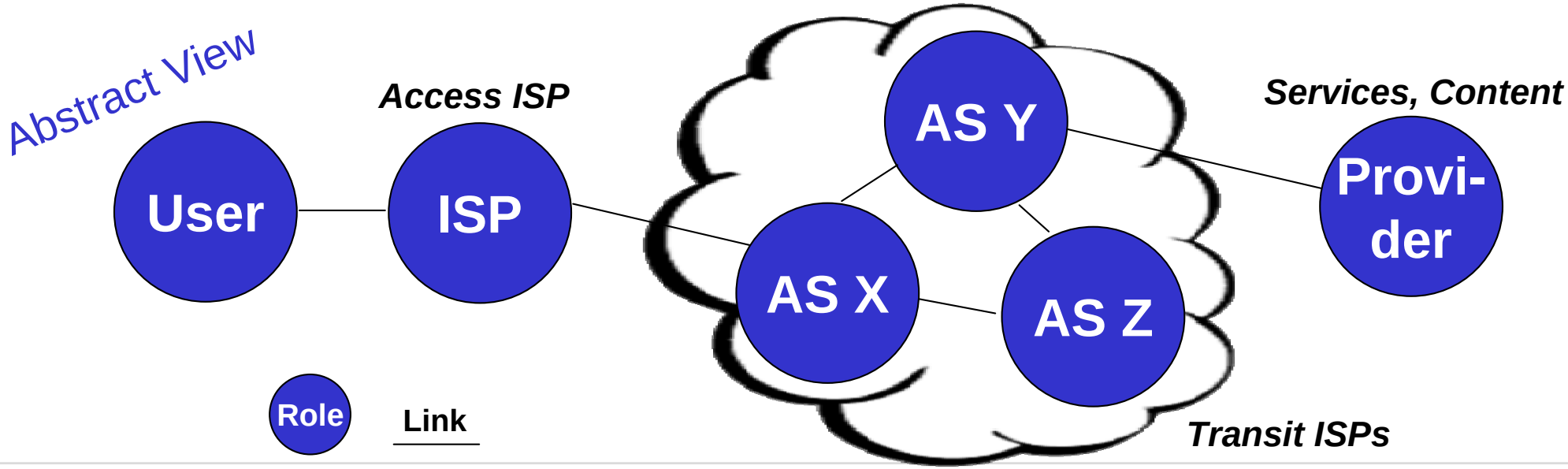

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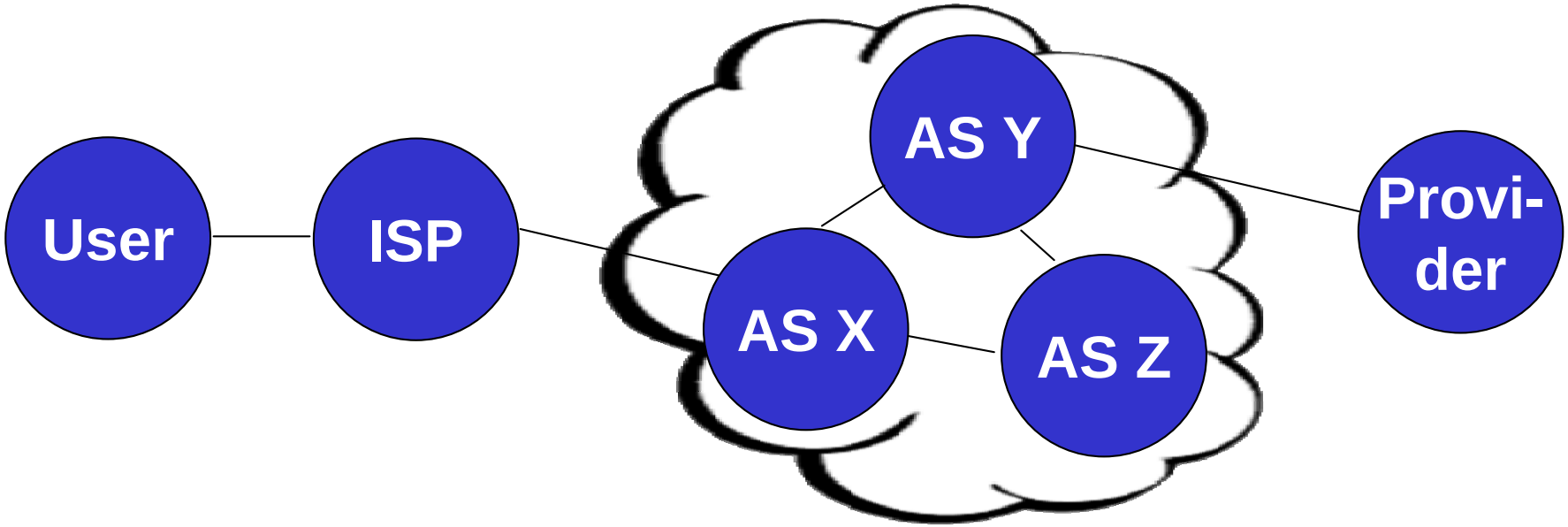
Blocking and Bypassing

ISP-based IP Address Blocking



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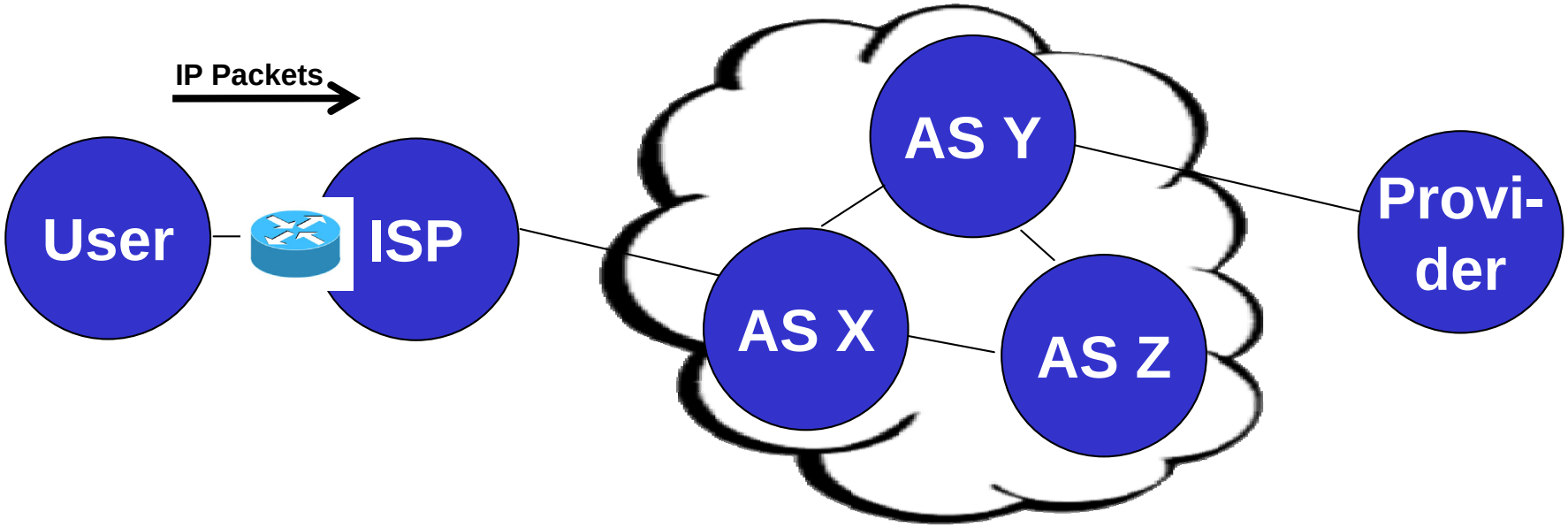

- Upon sending IP packets, at one ISP's router

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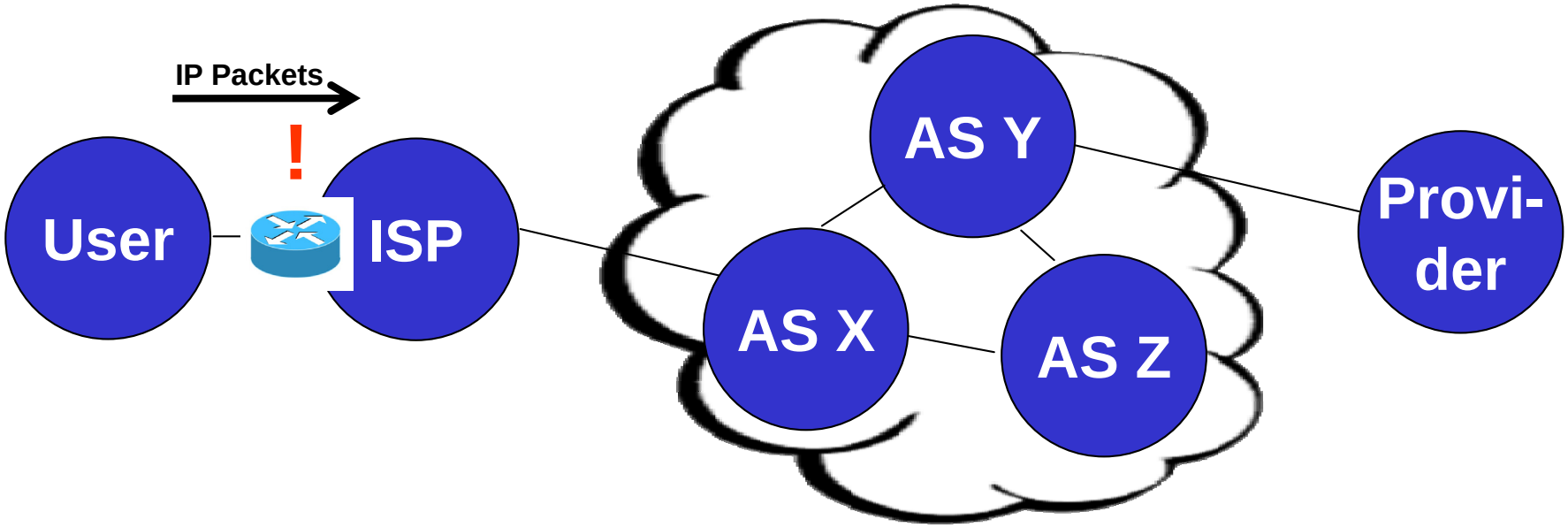

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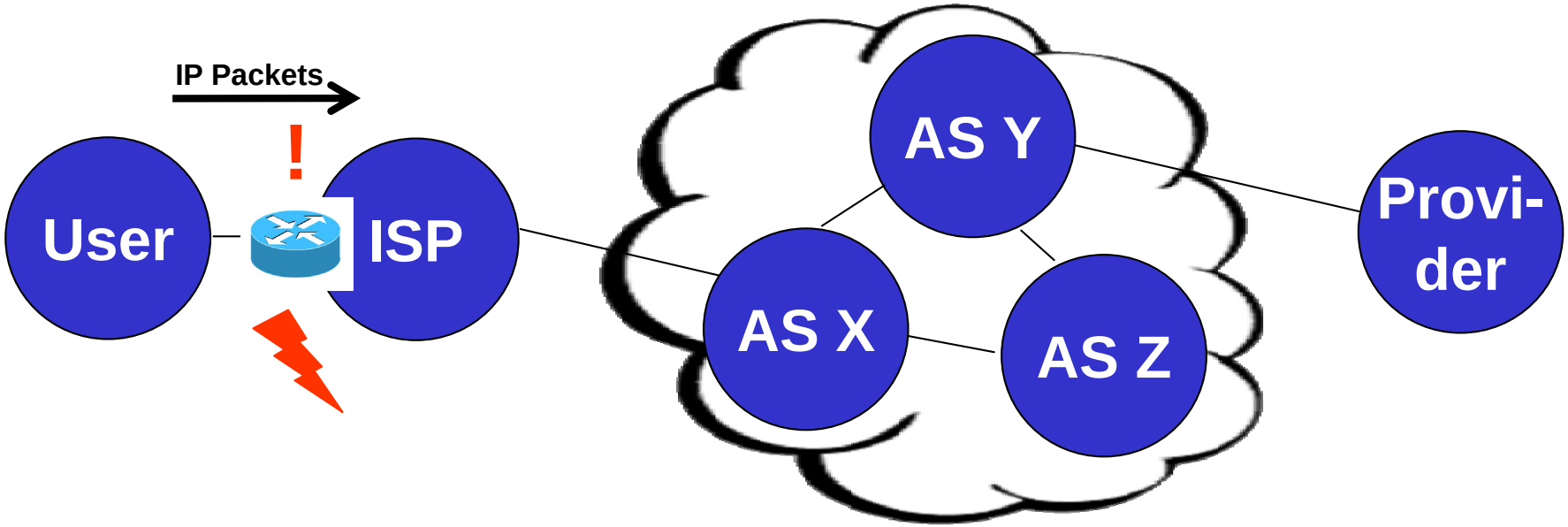

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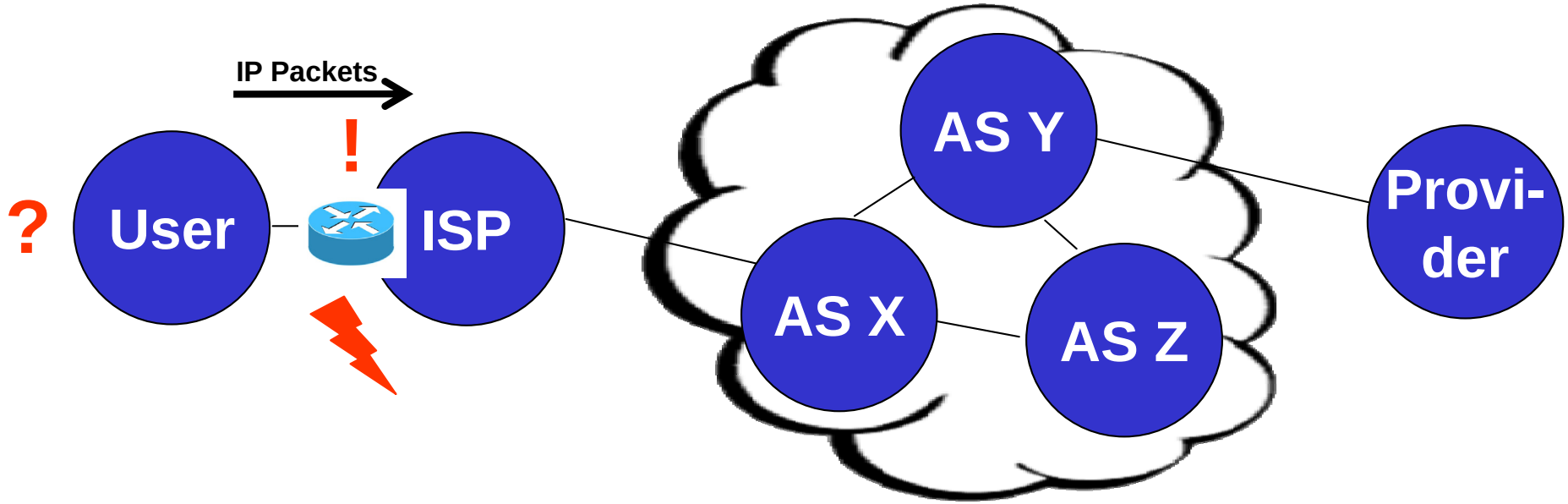

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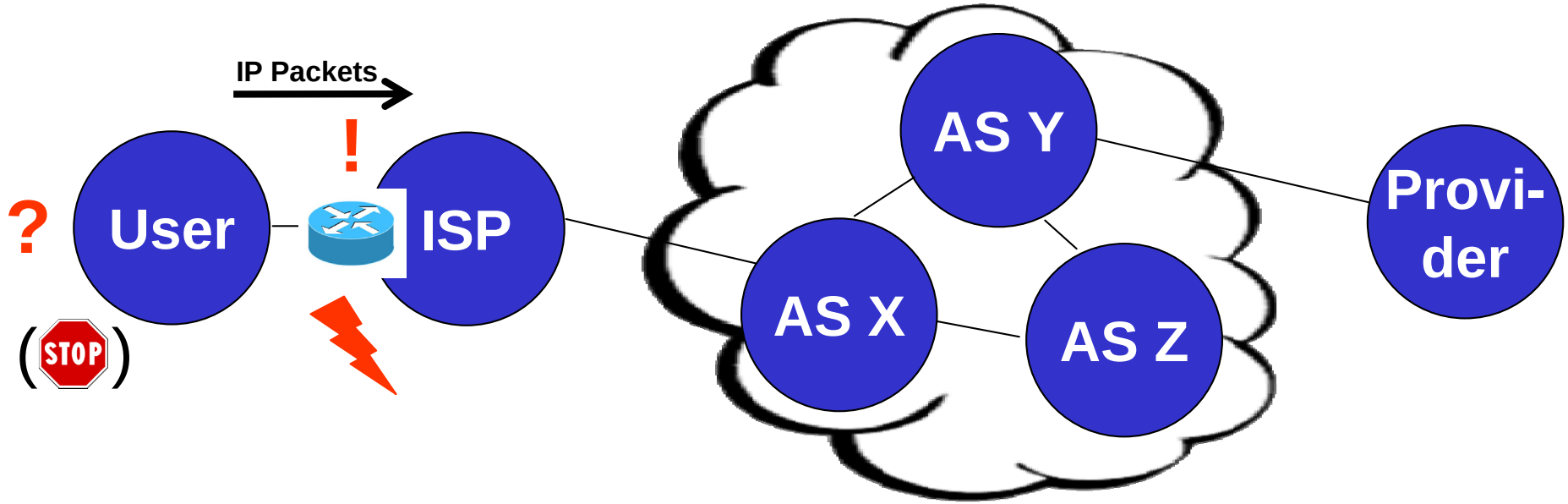

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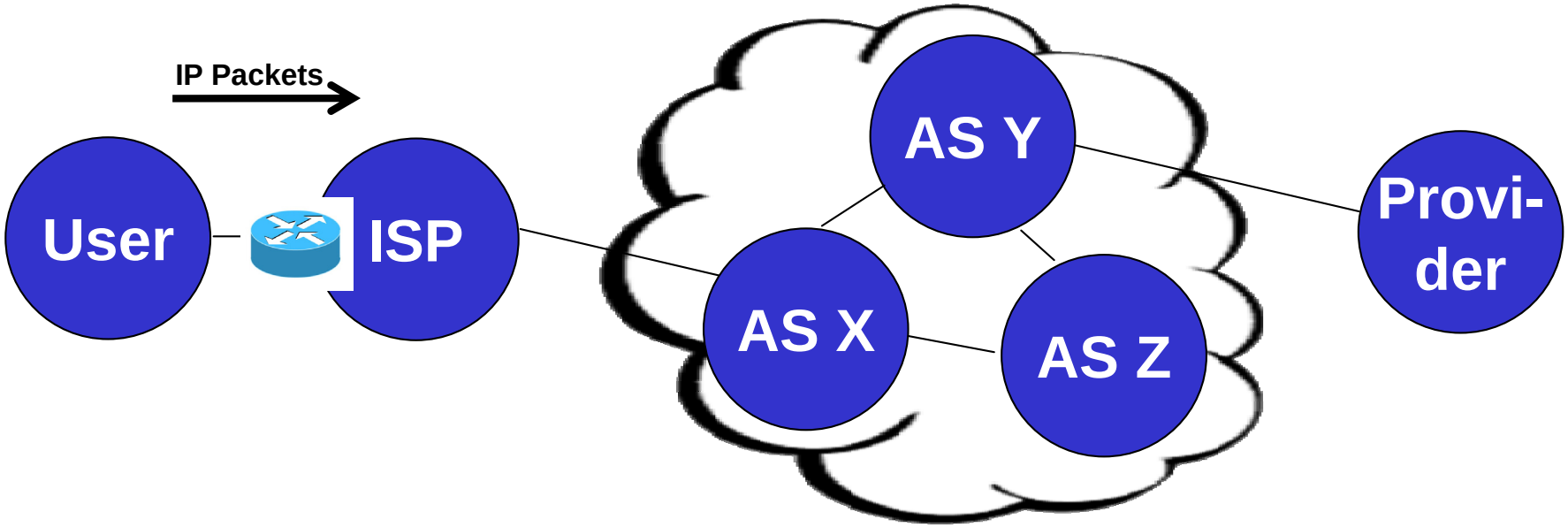
  - "Stop Page" display to user technically feasible
    - Large effort for ISPs (IP vs. Browser traffic)

Bypassing ISP-based IP Address Checks



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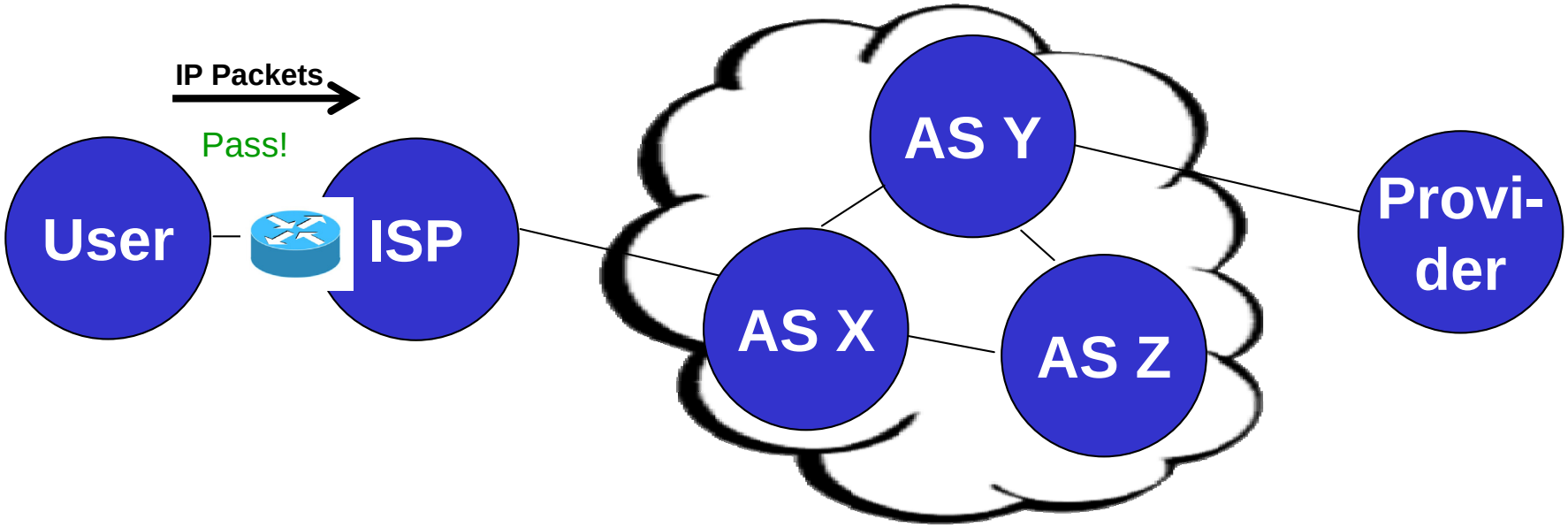

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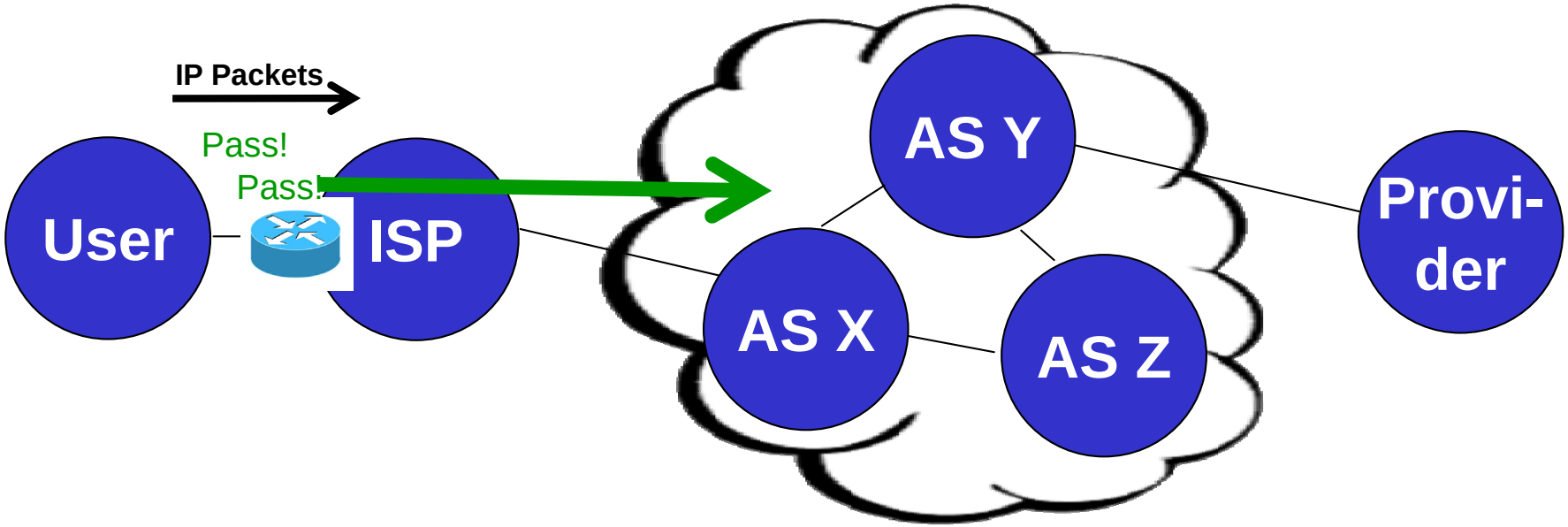

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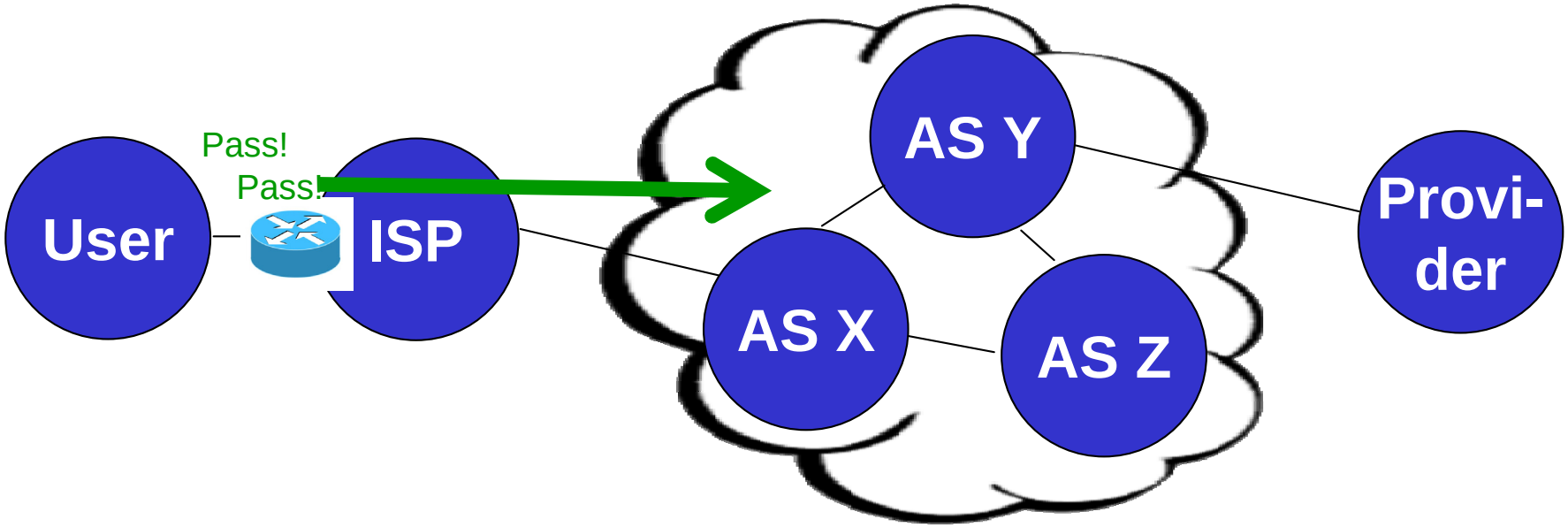

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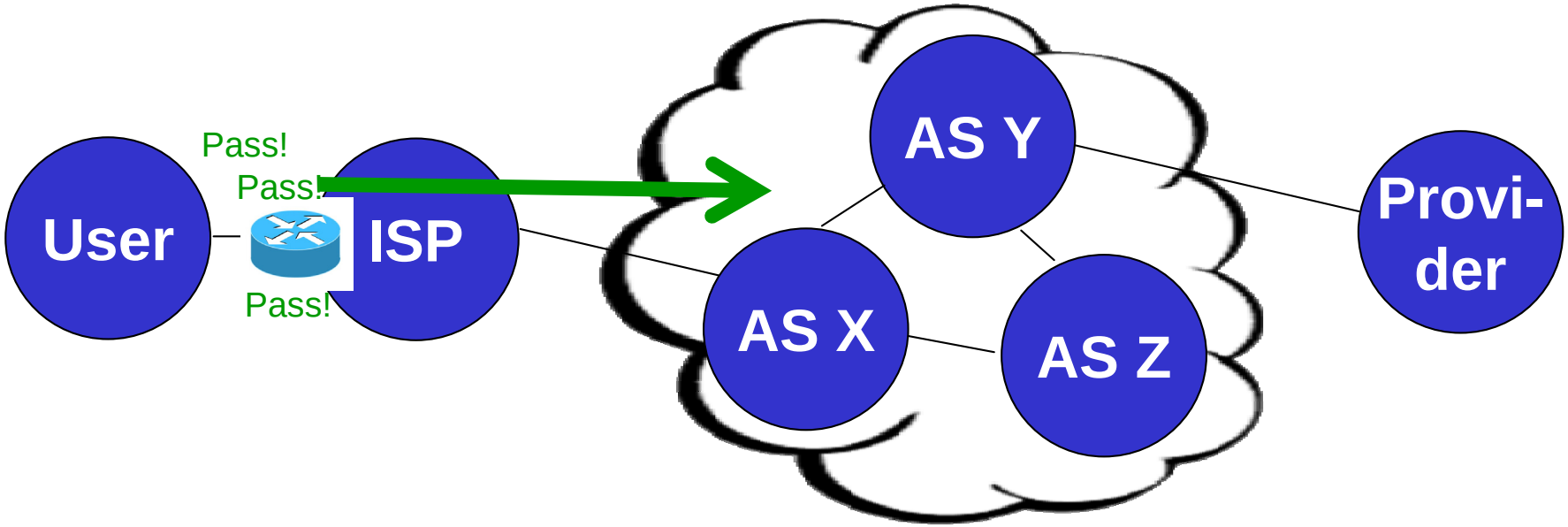

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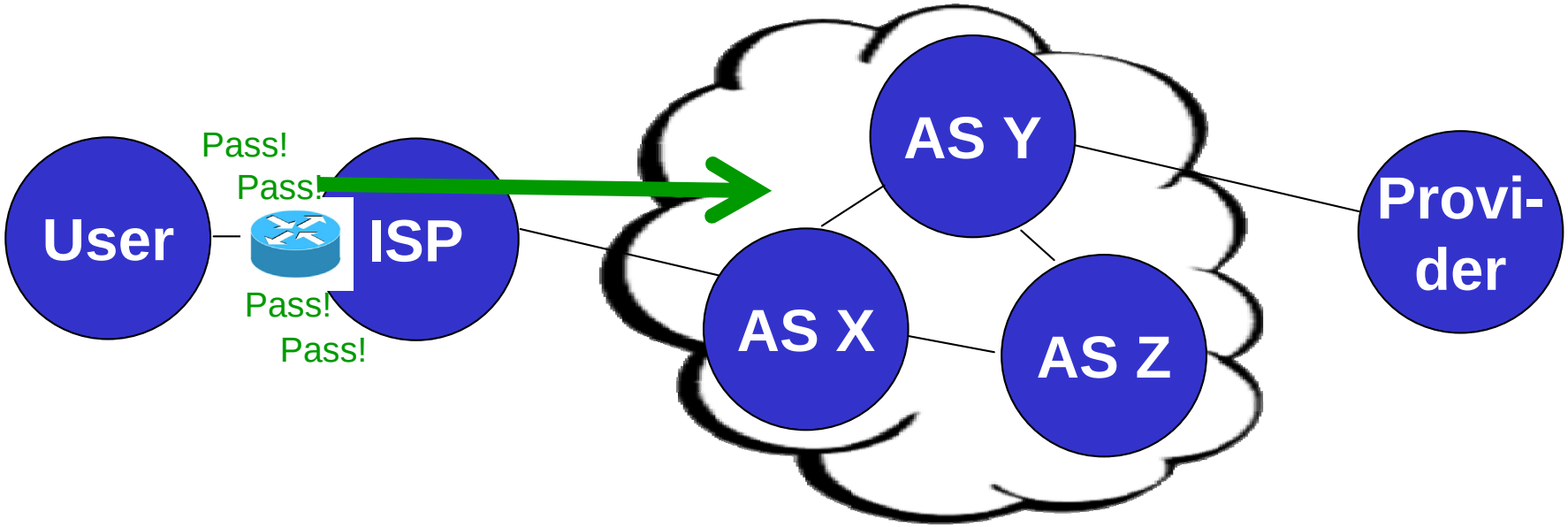

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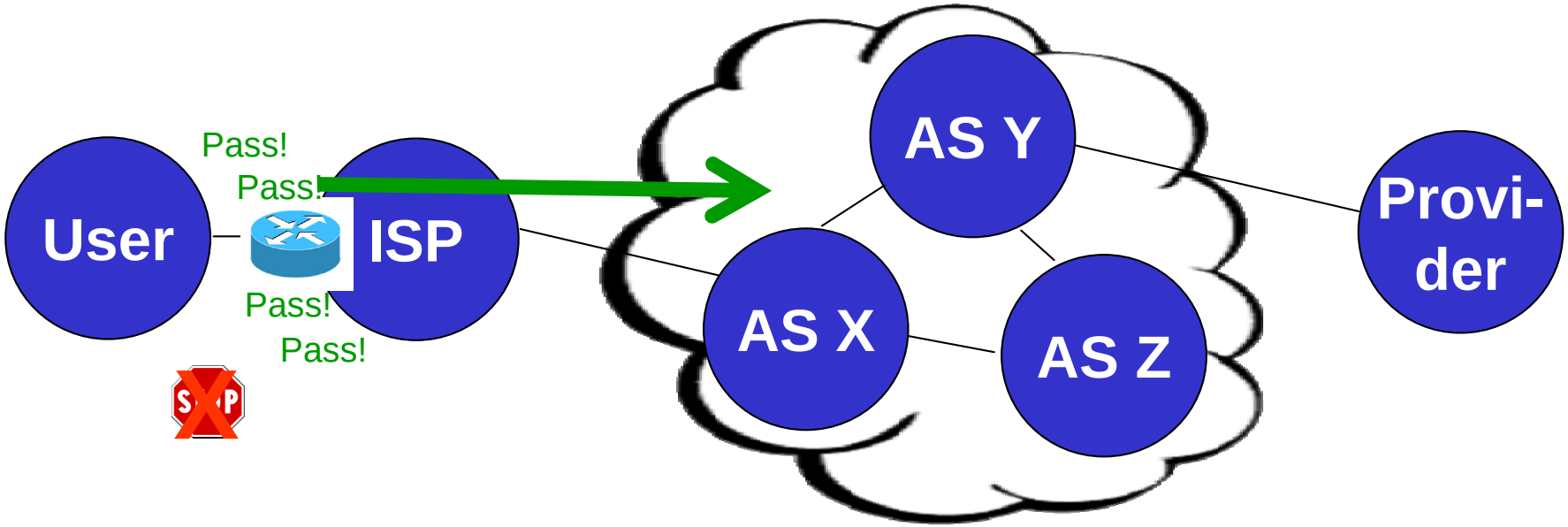

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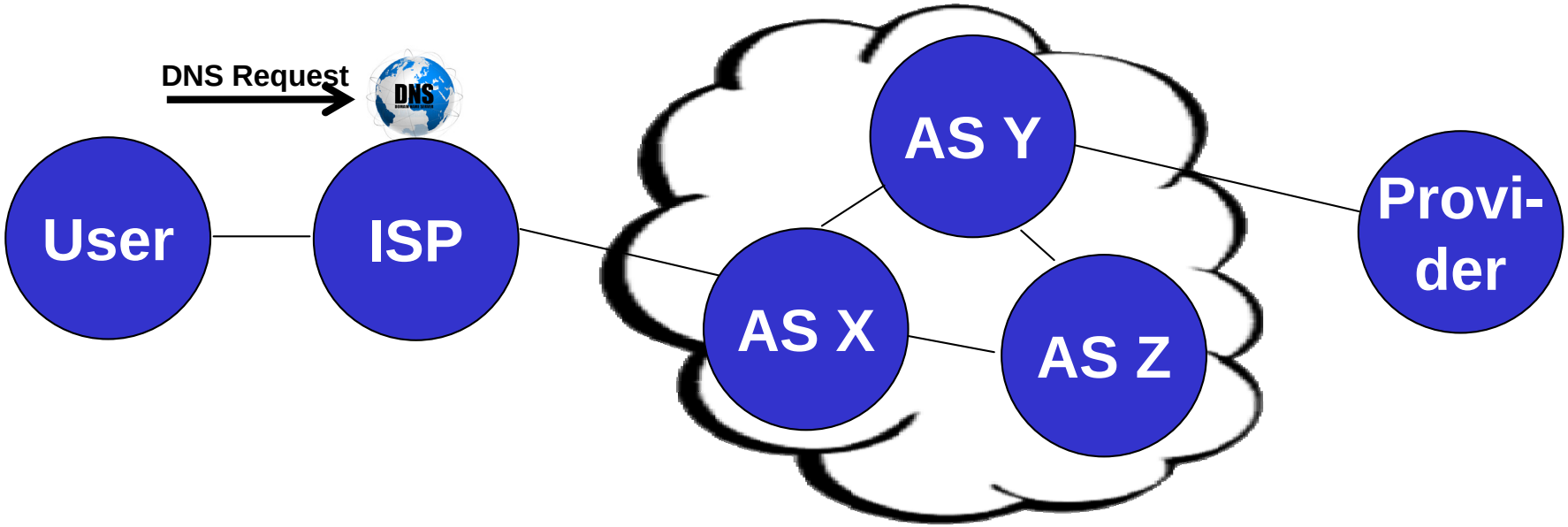

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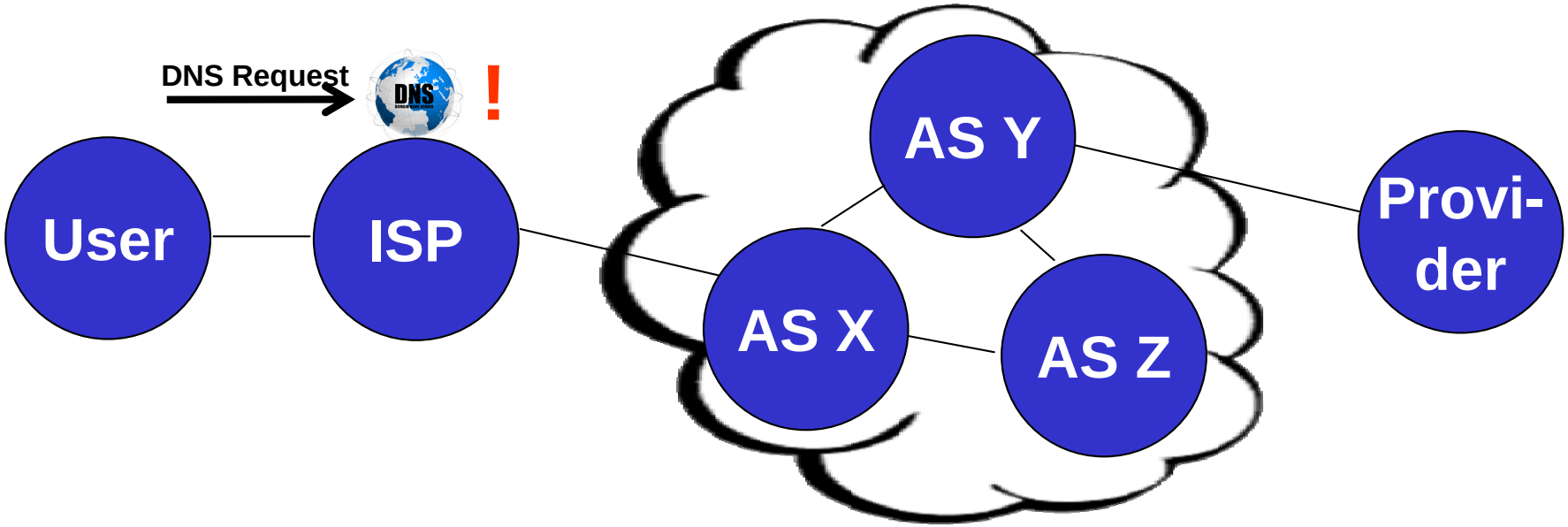

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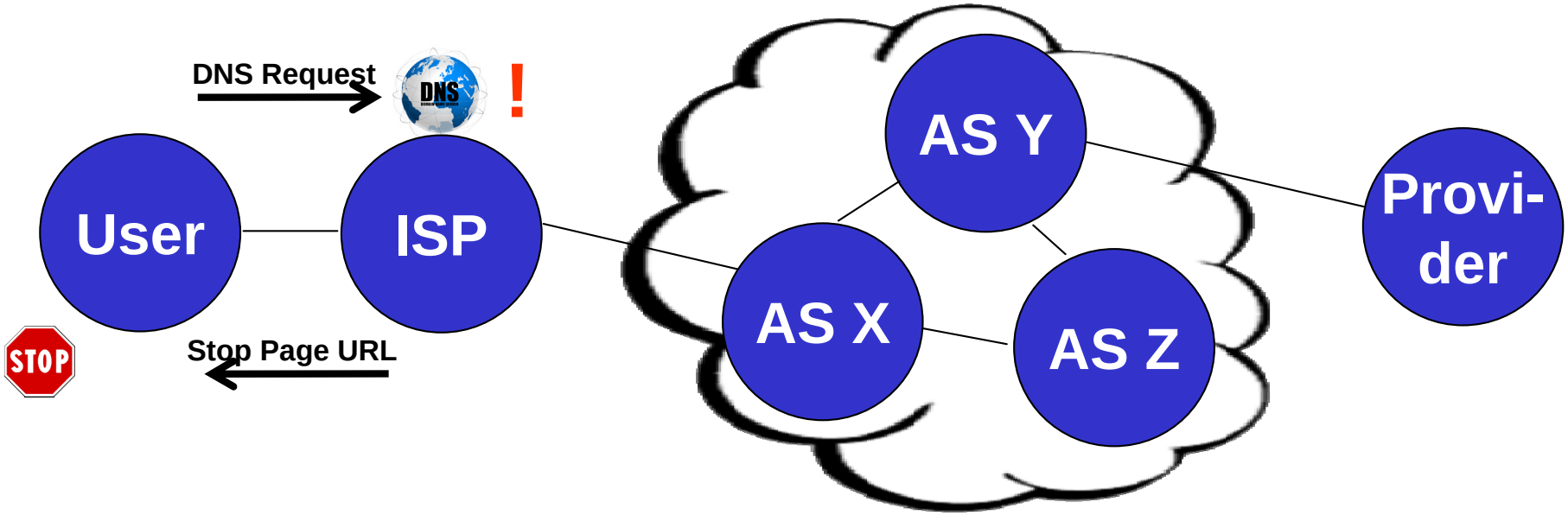

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  - Resulting in "Stop Page" display to user in Browser
    - Special page hosted at ISP with respective legal advise
    - Less effort for ISPs (DNS request → Browser traffic)

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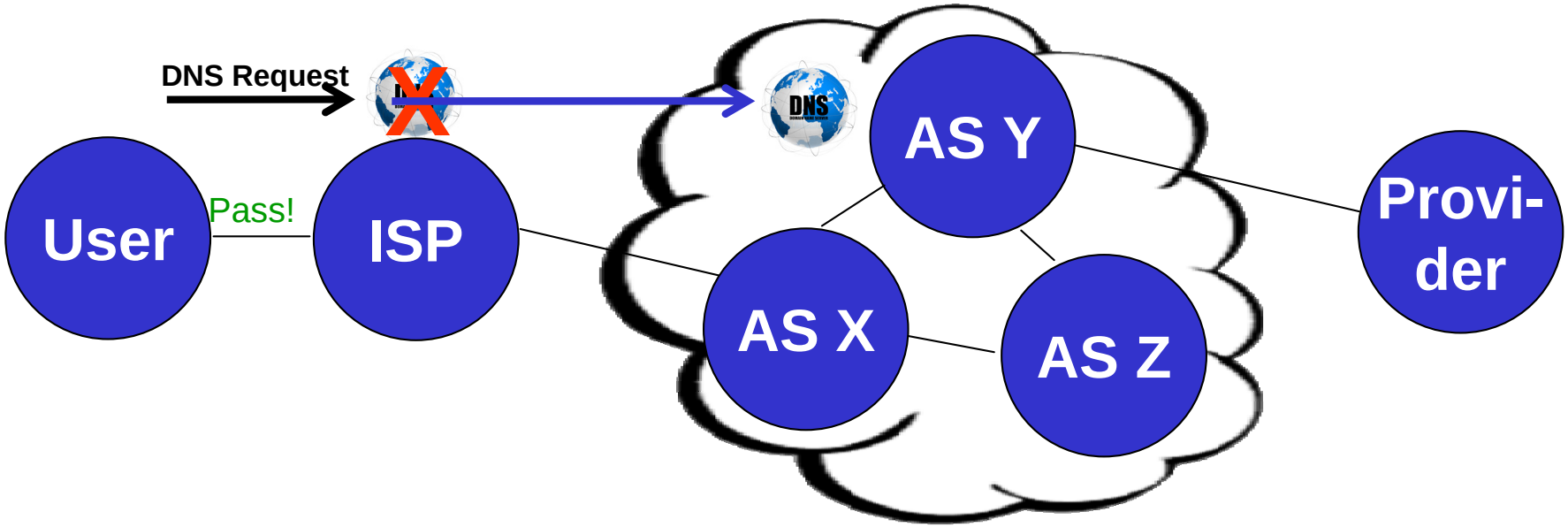

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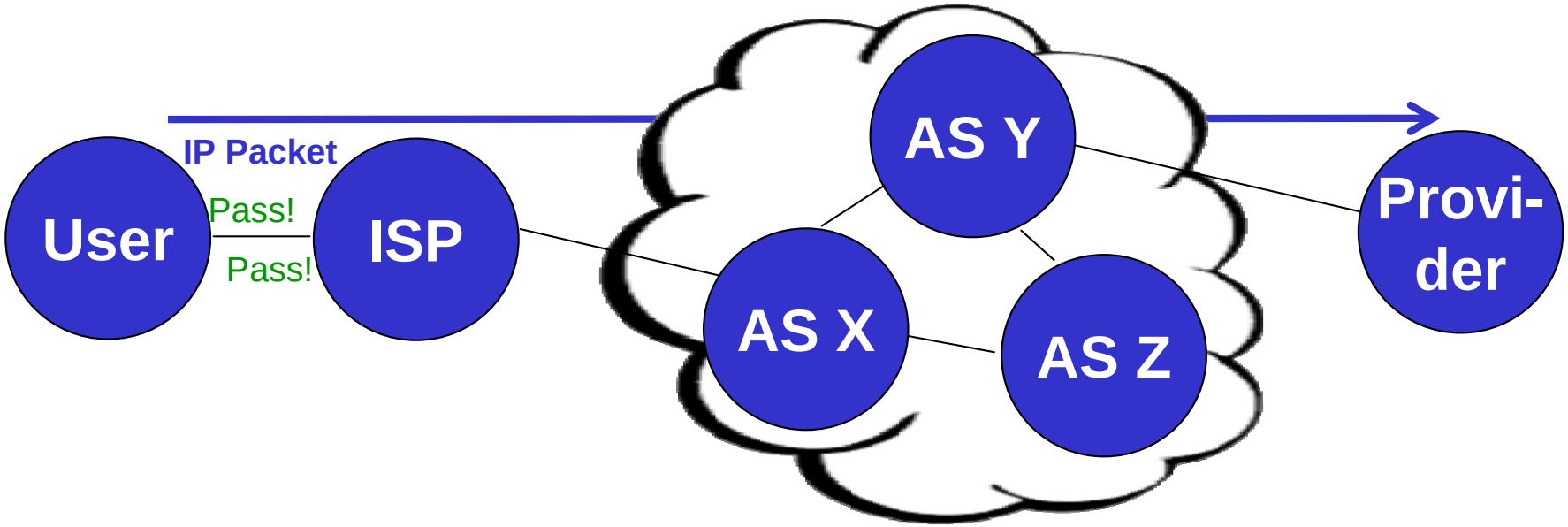

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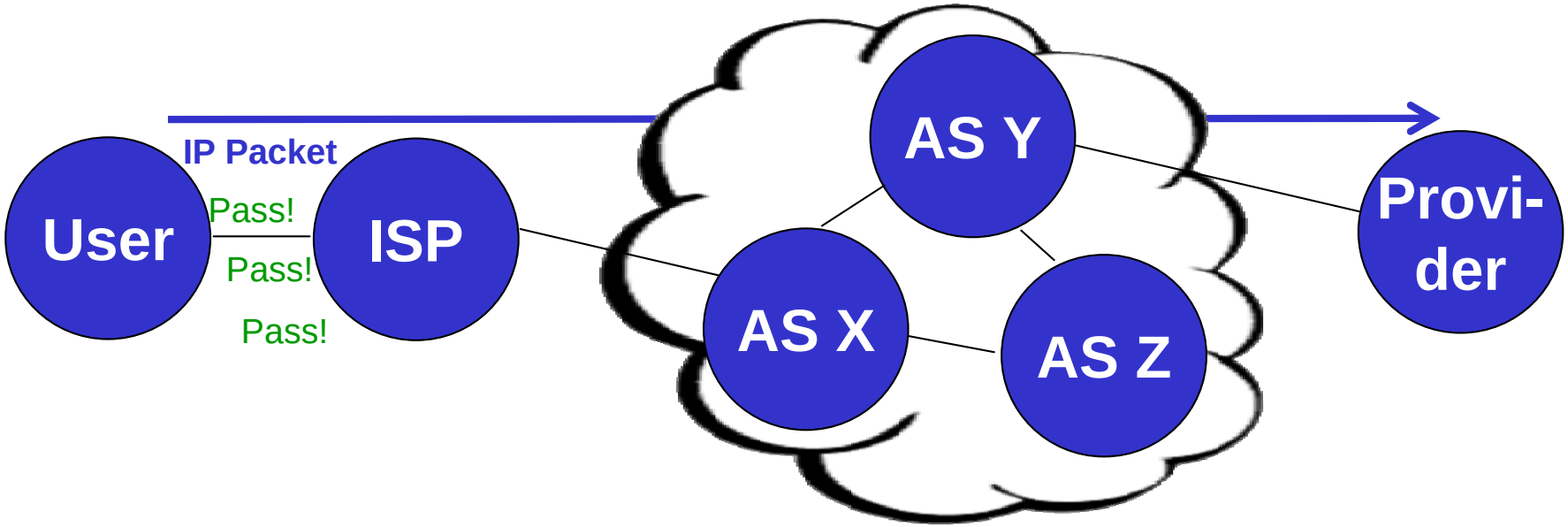

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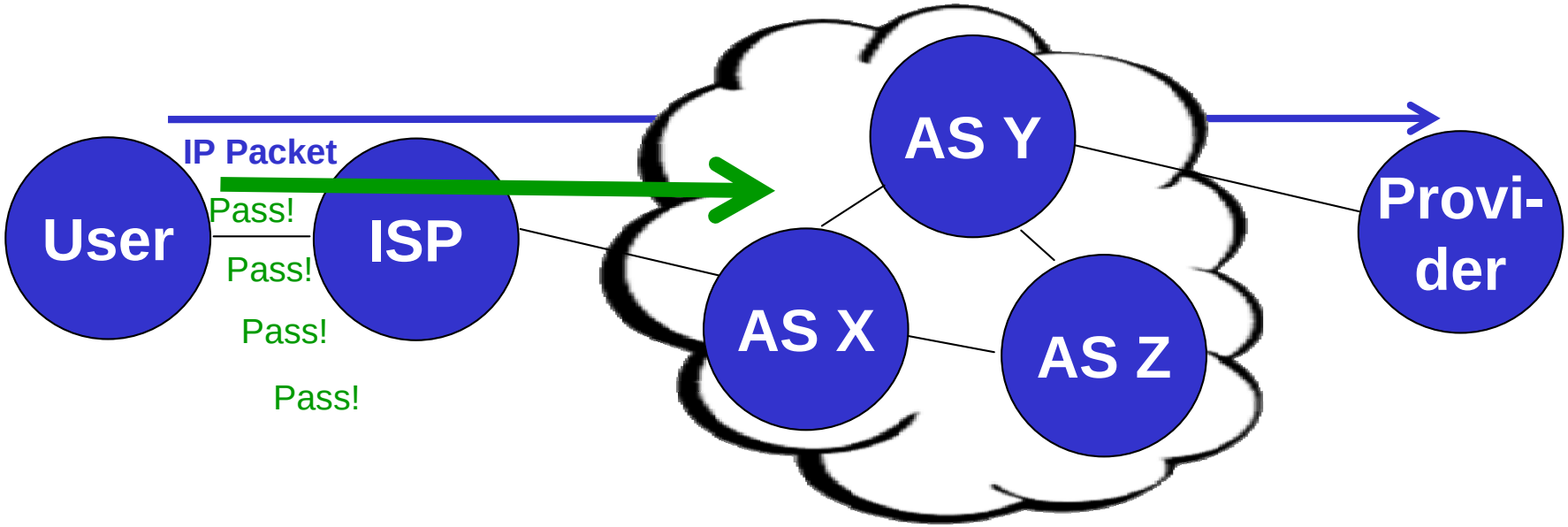

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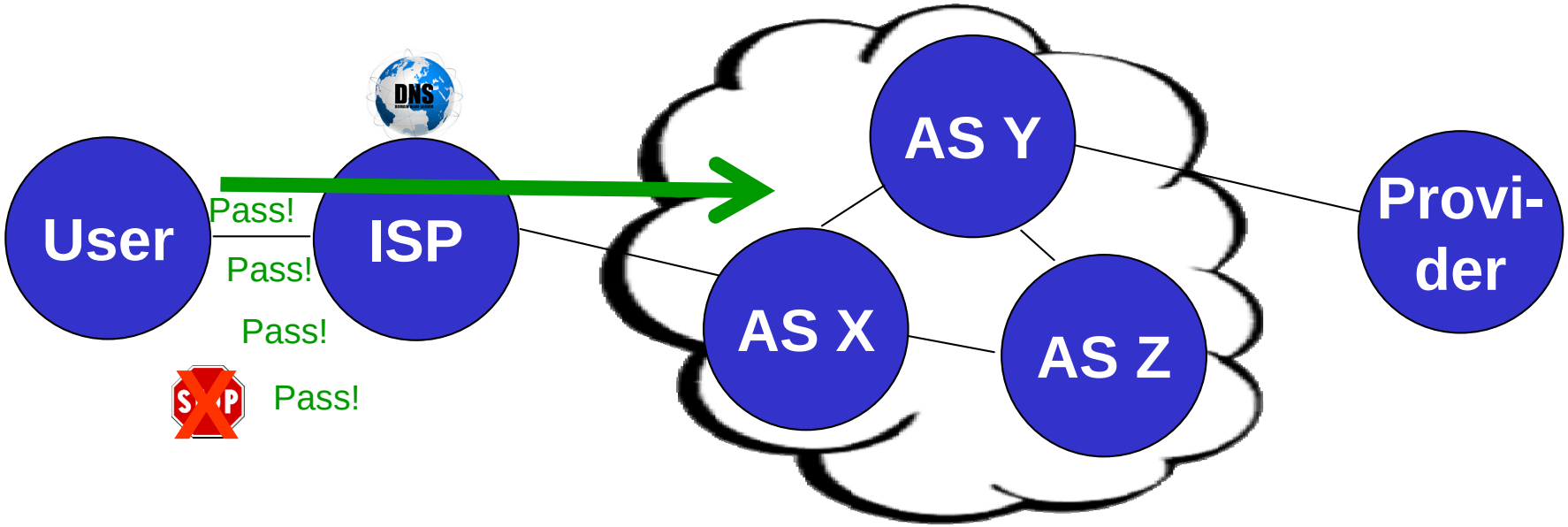

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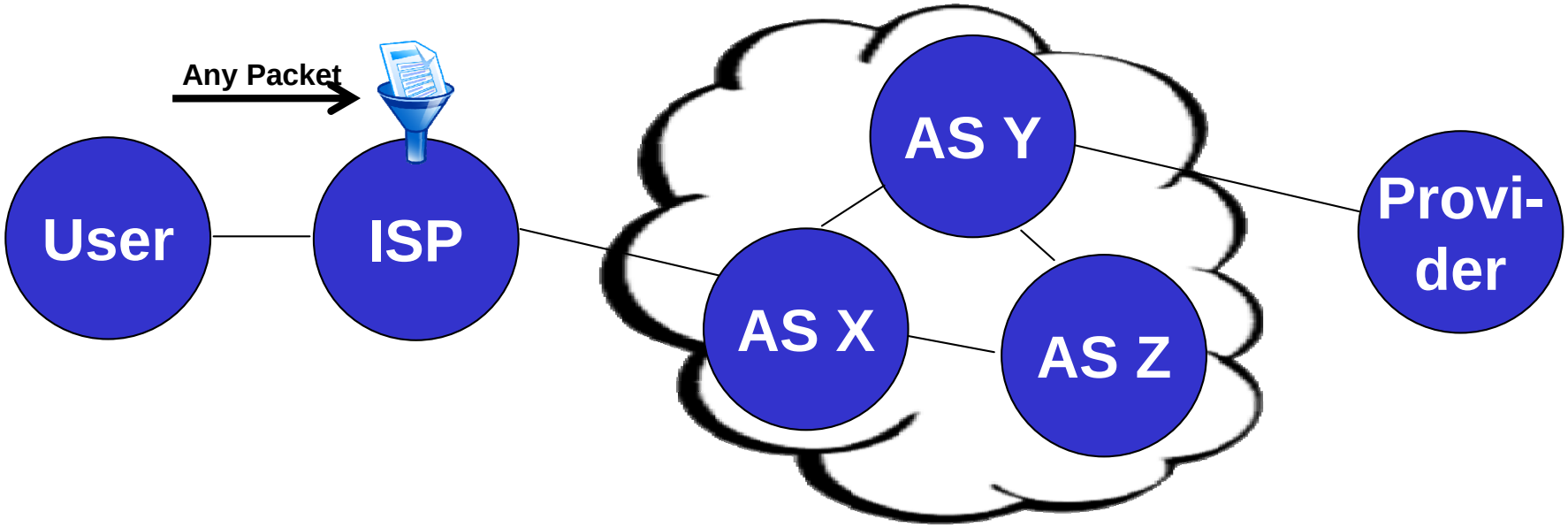

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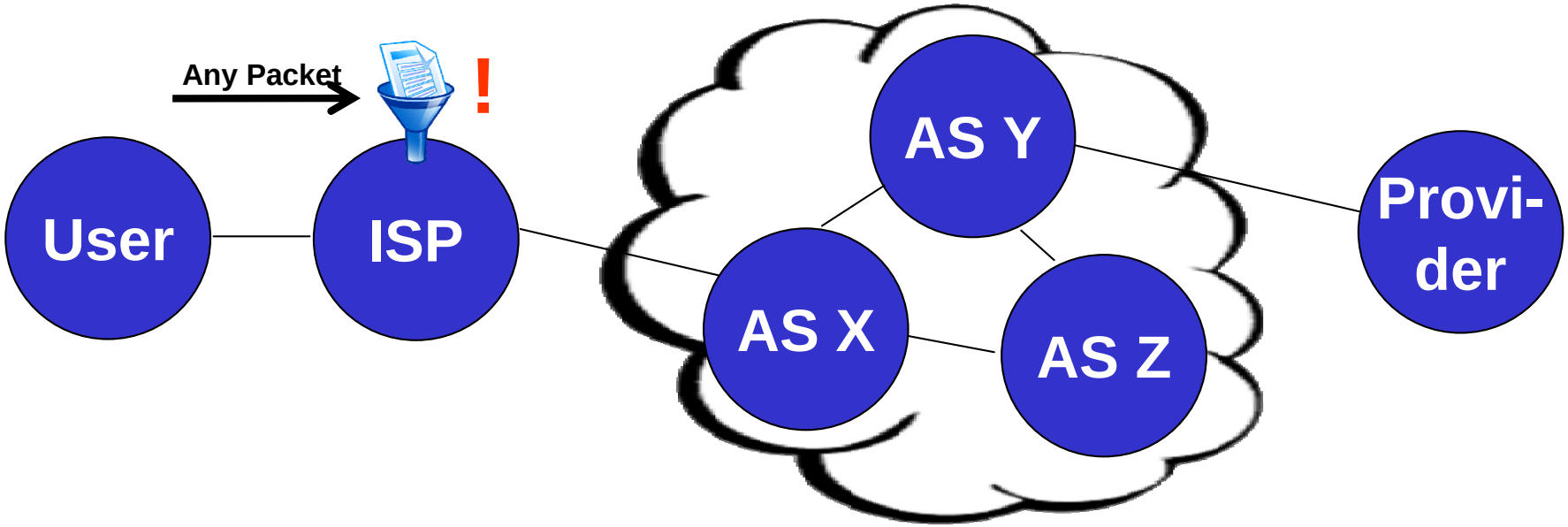

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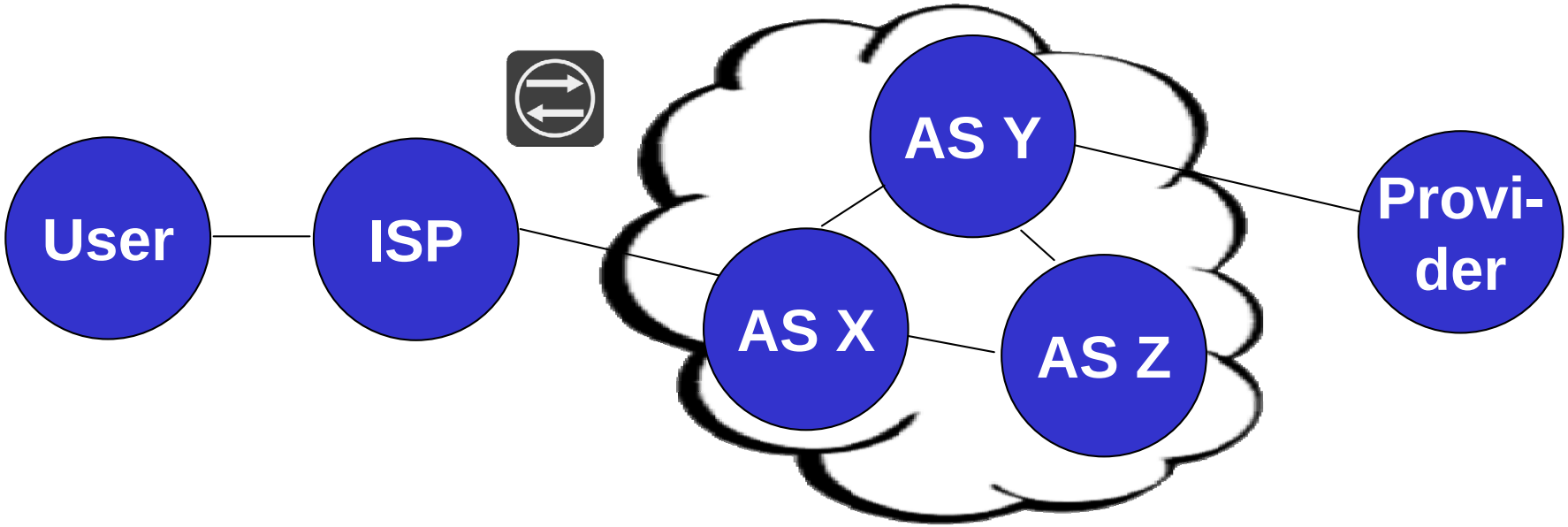

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- Proxy Servers (intermediary)
  - A forwarding service for rule-based packet/content handling

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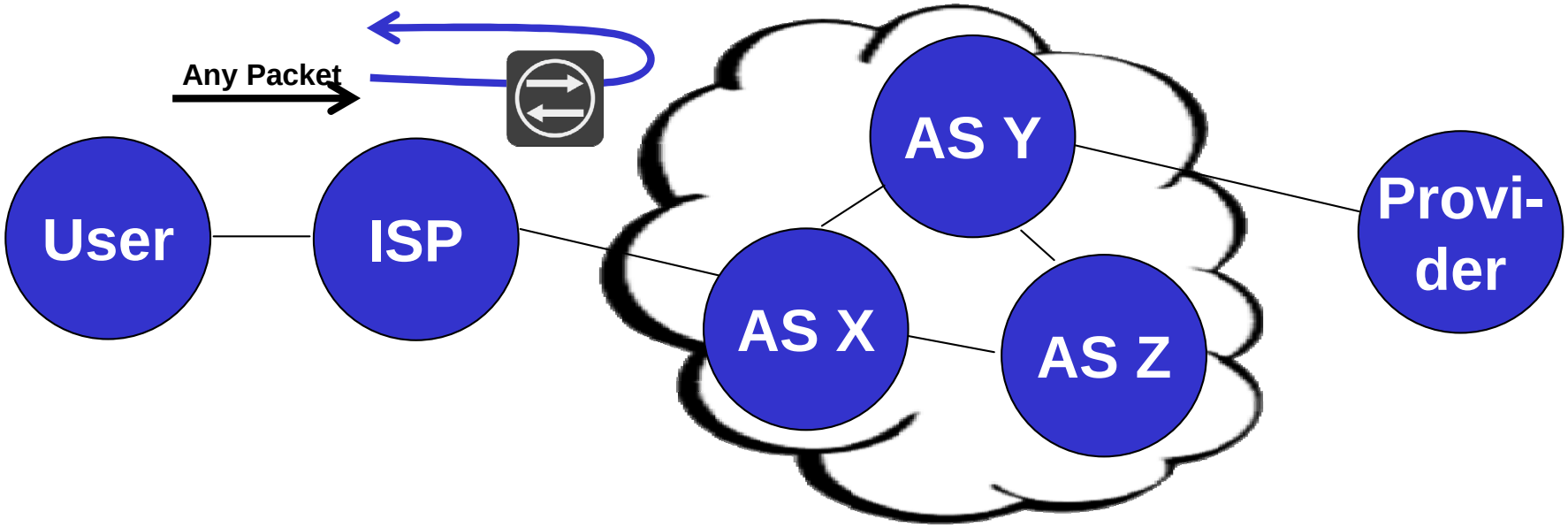

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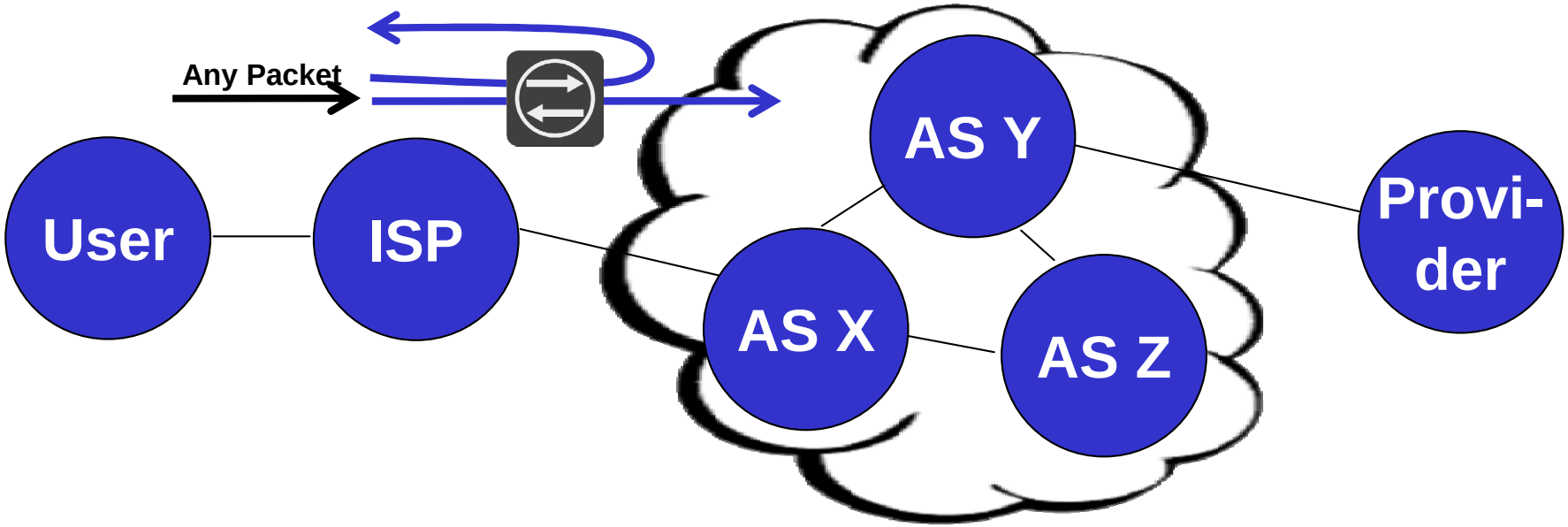

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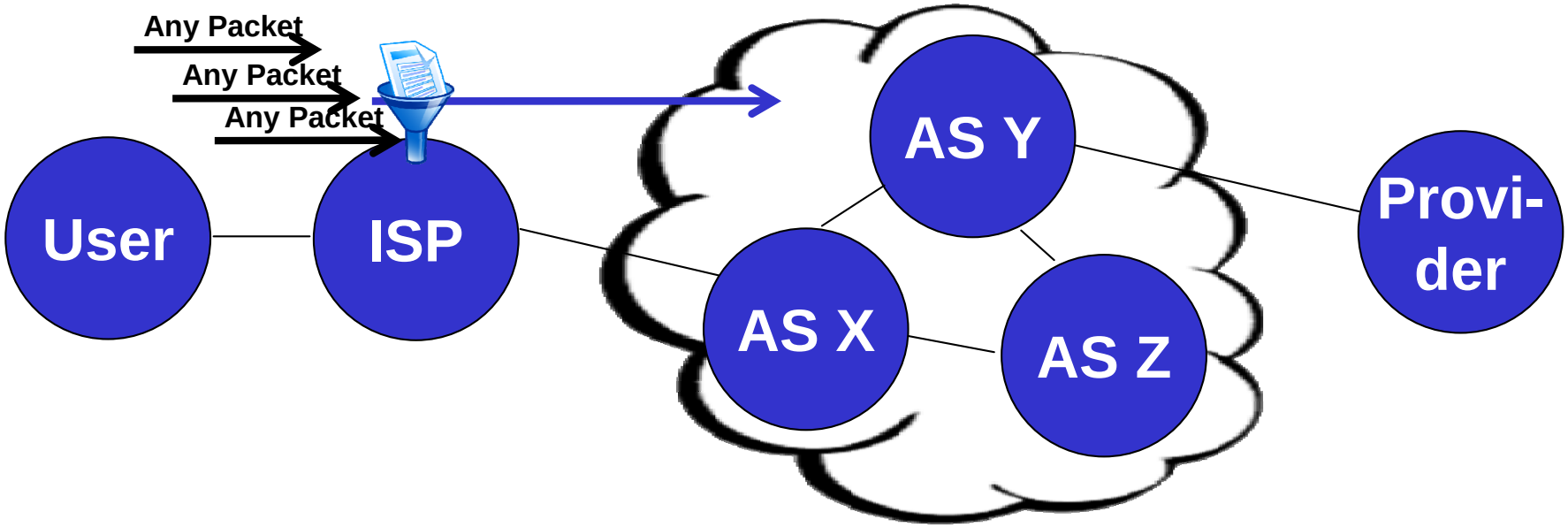

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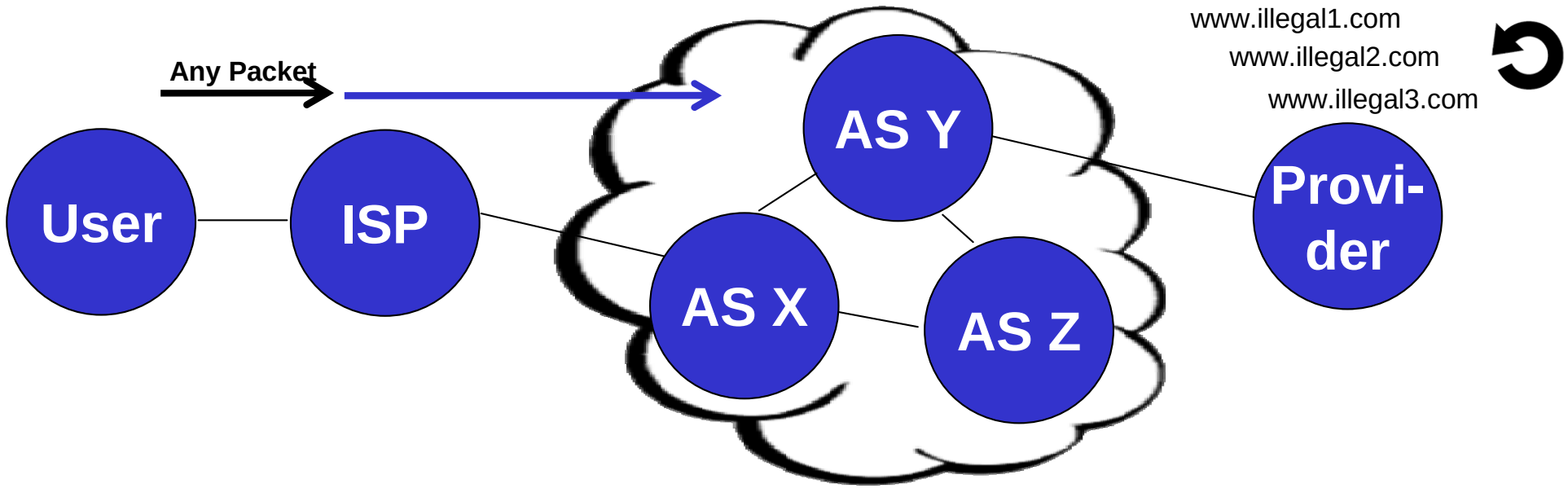

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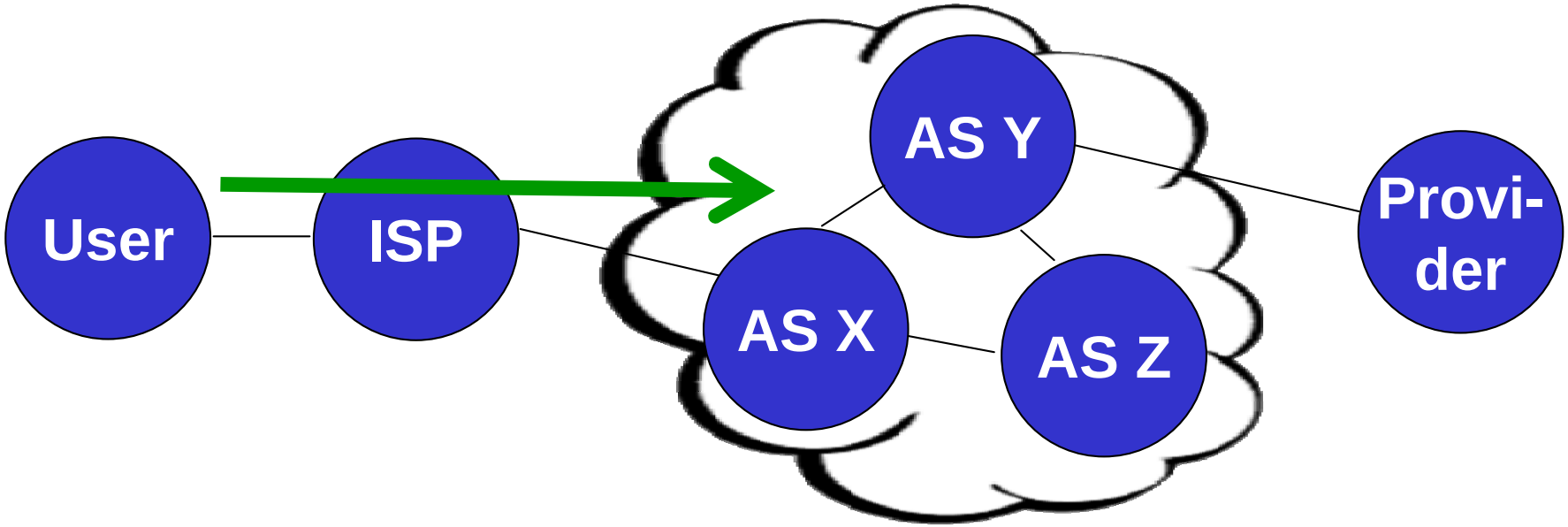

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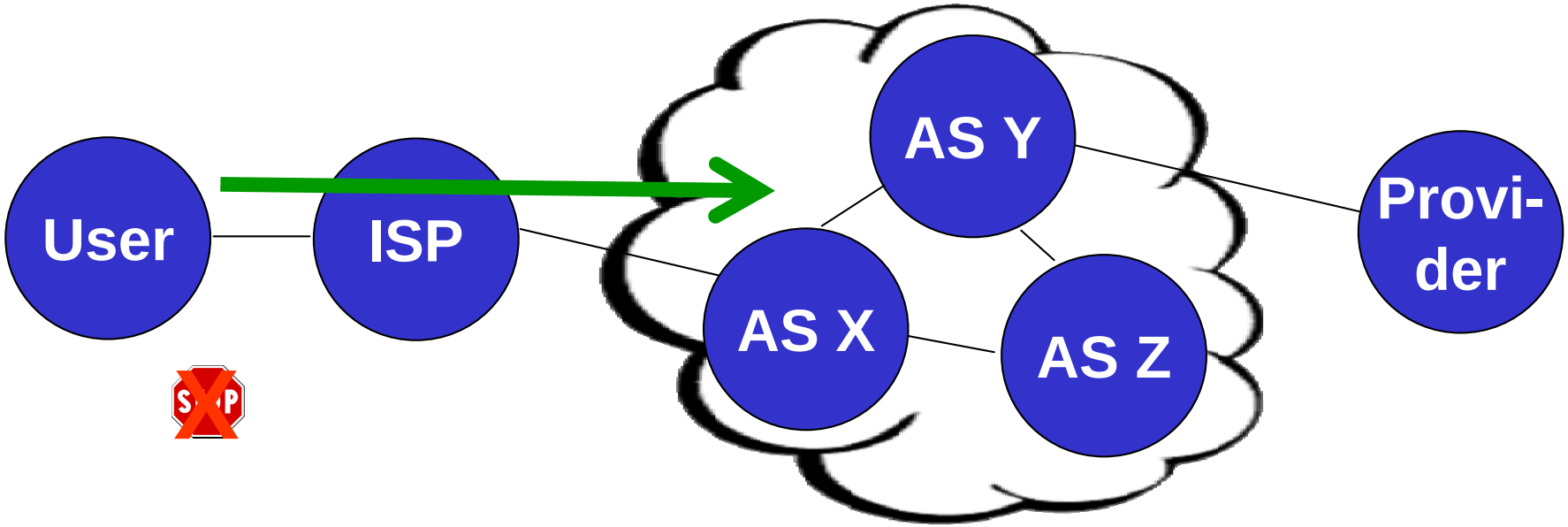

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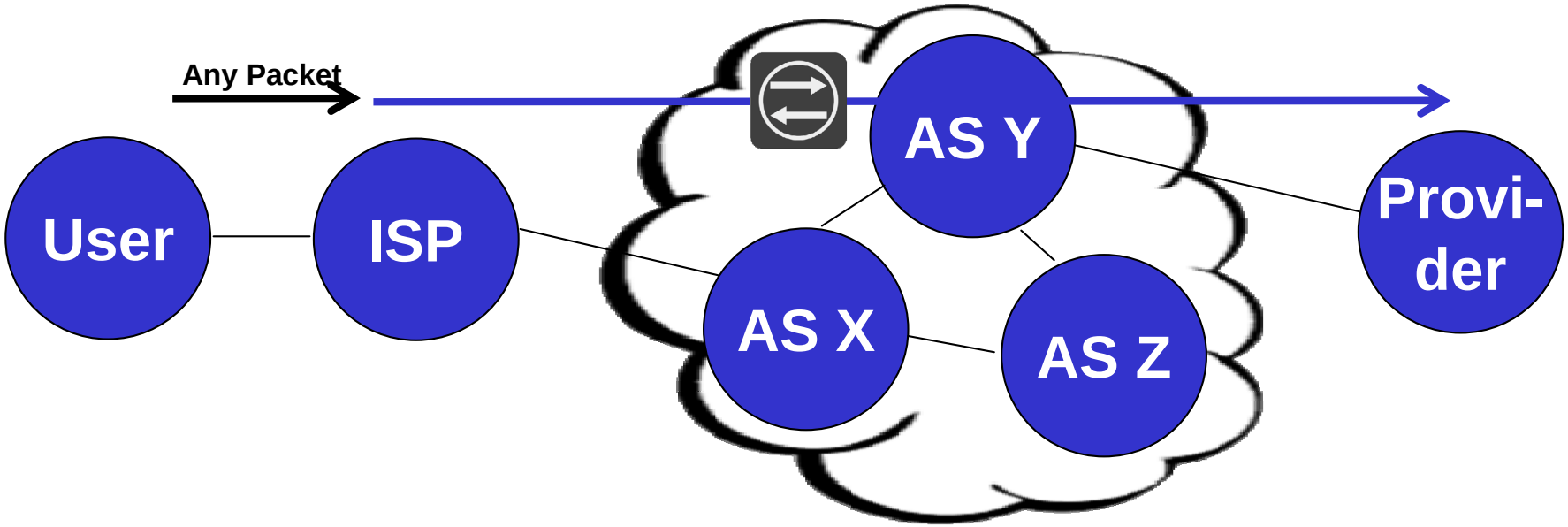

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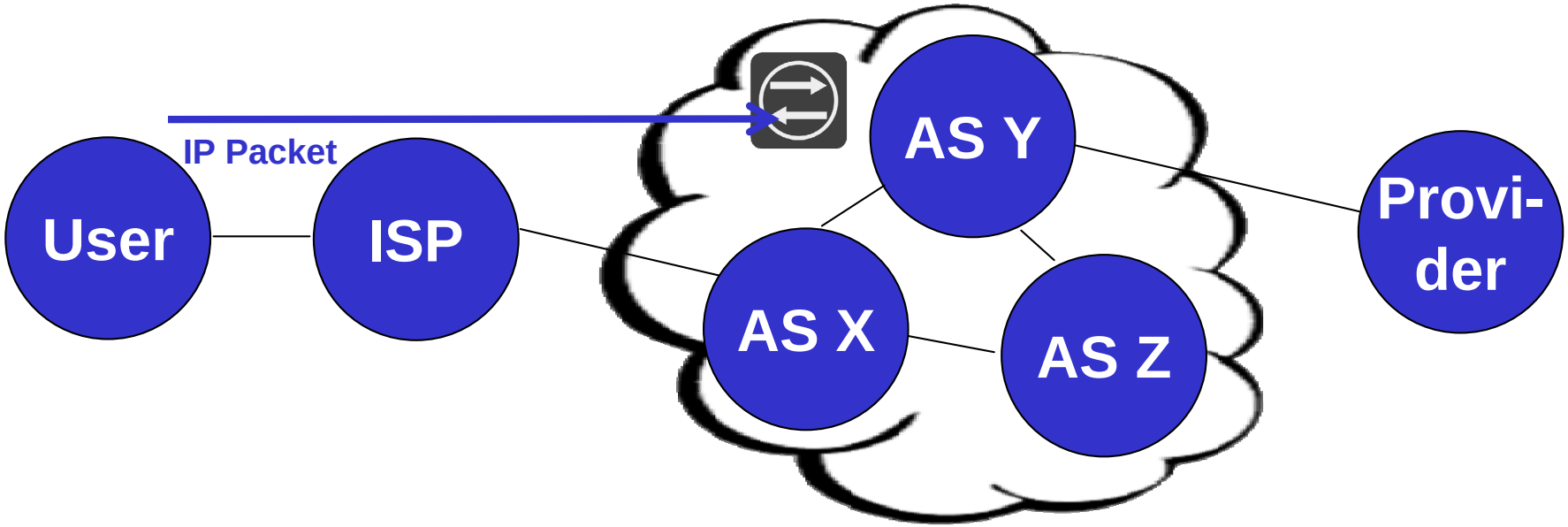

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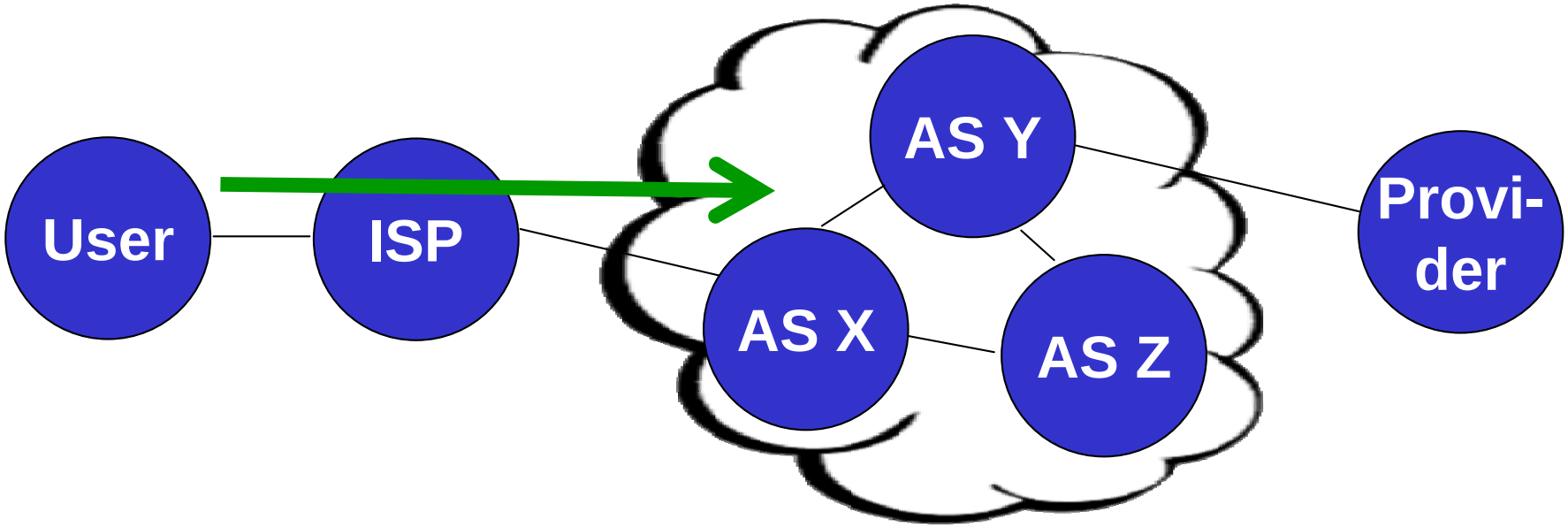

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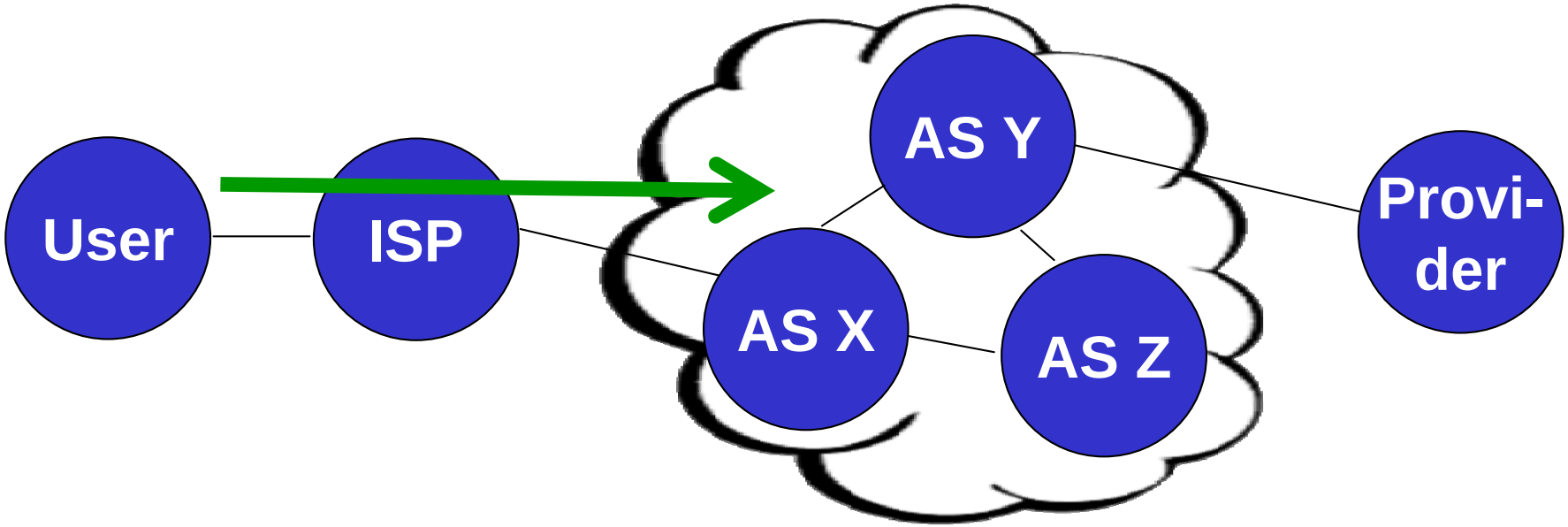

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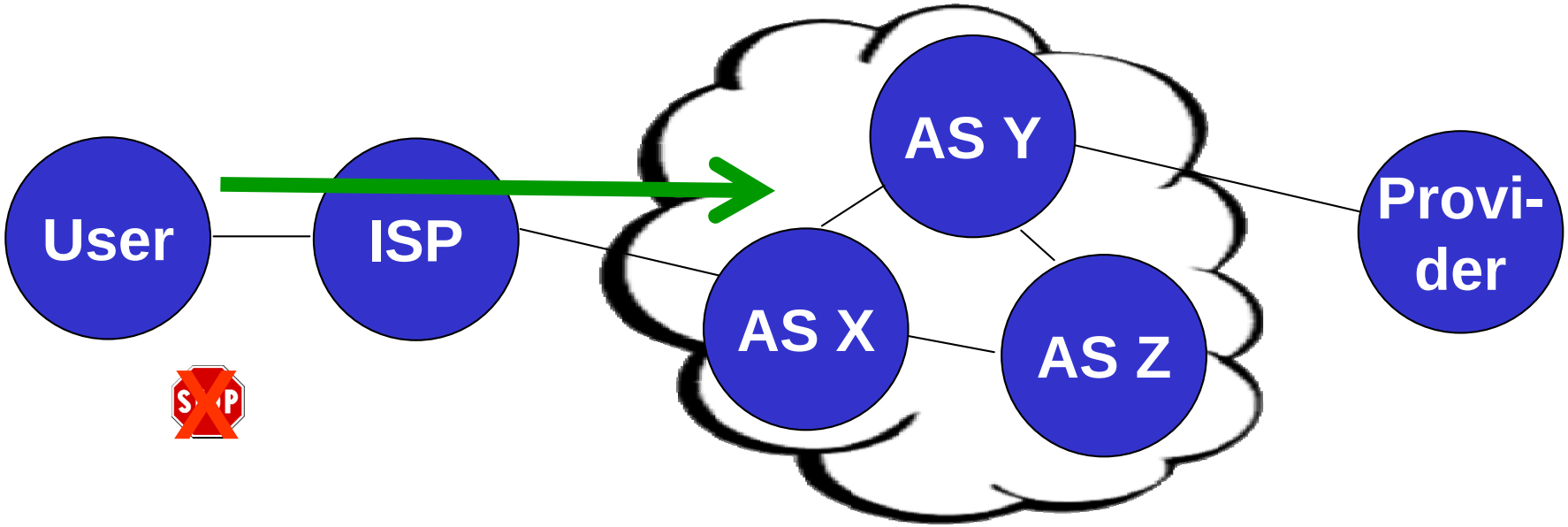

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- Internet traffic is more than DNS and Browser data
  - *E.g.*, Protocols (TCP, RTCP, UDP), Applications (E-mail, FTP, P2P), *Security Services* (HTTPS, SSL, TLS), Signaling

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Technical Conclusions

- Blocking IP addresses/DNS entries technically possible
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  - During operations: loss of “fast path” router capabilities
- Any such blocking – either installed by subnetwork operators or local ISPs – can be circumvented by even technically lower-skilled users

Thank you for your attention!