Debate

It is our belief that the future of the Internet is based on content-centric networking (CCN &/or NDN or COAST)

Architecture

Uses names in place of IP addresses, eliminating address space exhaustion and NAT traversal problems.

Two distinct packet types, interest packets, and content packets.

The regularly requested content can be cached in a node's Content Store. Whether data is cached on a node that it passes through is determined algorithmically. This allows for faster content delivery as a request does not necessarily have to reach the host's server to be fulfilled. If a node receives an interest packet for data already in its Content Store then the node can return the data packet.

Data caching across the network is also useful on wireless networks where rates of packet loss are higher. Packets would no longer have to be retransmitted from the host, instead of lost packets can be transmitted again from a previous node.

Two router tables, Pending Interest Table (PIT) and Forwarding Information Base (FIB).

The PIT can be checked each time an interest packet is received by the router to see if the router has recently received any other interest packets for the same (or similar) content. The router can choose to either forward the packet along the same route as a previous one (from the FIB), or wait for the corresponding data packet to be received from a previous request and simply make a copy of it to fulfill all the interest checks at once. This again allows for faster and more efficient content delivery.

Using the PIT also makes it easier for networks to scale. Grouping like requests together reduces the overall bandwidth needed by not having forward every interest request received.

Security

Security of content-centric networks should be considered of paramount importance.

Research has shown that Caching can save bandwidth by redistributing the same content requests. In addition, intrinsic security features, such as COAST's validating interest as well as content packets, ensure transmission of legal traffic (Ding, Yan, and Deng, 2016). These methods allow for a decreased risk of DDoS attacks.

NDN guarantees data integrity by employing a digital signature.

Due to the content being cached on the routers, confidentiality and privacy are at risk. Possible mitigation proposed is an Attribute-Based Encryption scheme (ABE), which hides the name and content cached behind encryption, leading to better privacy and confidentiality (Badsha et al., 2018).

All of these models are subject to privacy concerns and have been described as potentially a “step back” in terms of confidentiality and privacy. One of the proposed solutions to address privacy concerns have been to encrypt data individually, however, this would eliminate the usability of cached content. A suitable solution is still being researched.

Efficiency

The Internet is more than 45 years old. According to CISCO Systems, the global traffic should grow by 22 percent per year through 2020 and reach its billion users. (GLENN EDENS, GLENN SCOTT, 2017) Everybody wants to stream videos, download and upload some content, ...

An alternative architecture such as NDN and the COAST might provide better performance for the Internet of tomorrow.

NDN and the COAST are content-centric rather than host-centric (actual architecture).

CCN is known to have advantages of:

- Reducing congestion and latency by eliminating redundant data delivery, (Seongik Hong, 2013)
- Ensuring secure data delivery by content protection, (Seongik Hong, 2013)
- Improving delivery efficiency by utilising multiple paths over IP-based networking paradigm. (Seongik Hong, 2013)

By focusing on the location of content rather than tracking down the address of its original host, a CNN network can be more nimble and responsive. (GLENN EDENS, GLENN SCOTT, 2017) This kind of network would be more reliable as it would allow any content to be stored anywhere (nodes) in the network. This should improve the speed of the entire network.

References:

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