O-ICN Simulator (OICNSIM)

OICNSIM, an ns3 based simulator, simulates the Overlay Information Centric Networking (O-ICN) Architecture [1, 2]. Some of its main components are described below:

Client : There are two types of clients, (i) OicnZipfClient (ii) OicnClient supported by OICNSIM. User can select either of the clients or both of the clients in the topology.

i. **OicnZipfClient**
   1. A separate application for sending ICN type requests.
   2. It generates request for the contents following Zipf-Mandelbrot Distribution.
   3. It sends name resolution request to ICN Manager at port 36.
   4. ICN Manager does the name resolution and send acknowledgement to the client at source port. It also directs source (ICN router or OICN server) to send the requested content to the OicnZipfClient at client port 26.

ii. **OicnClient**
   1. A separate application for sending ICN type requests.
   2. It sends name resolution request to ICN Manager at port 36.
   3. ICN Manager does the name resolution and send acknowledgement to the client at source port. It also directs source (ICN router or OICN server) to send the requested content to the OicnClient at client port 26.

ICN Manager (ICNM)
1. A software module that is currently deployed standalone [1].
2. It listens to name resolution requests from the clients at port 36.
3. It first searches the name in *cachedRouterTable* (container to store mapping of name and corresponding IP address of the ICN Router), if the name is not present in *cachedRouterTable*, then it searches the name in *nameServerTable* (container to store mapping of name and corresponding IP address of the server) and gets corresponding source (ICN router or OICN server) IP address.
4. After getting the IP address of source of the content, it directs the source to send the requested content to the corresponding client at port 26.

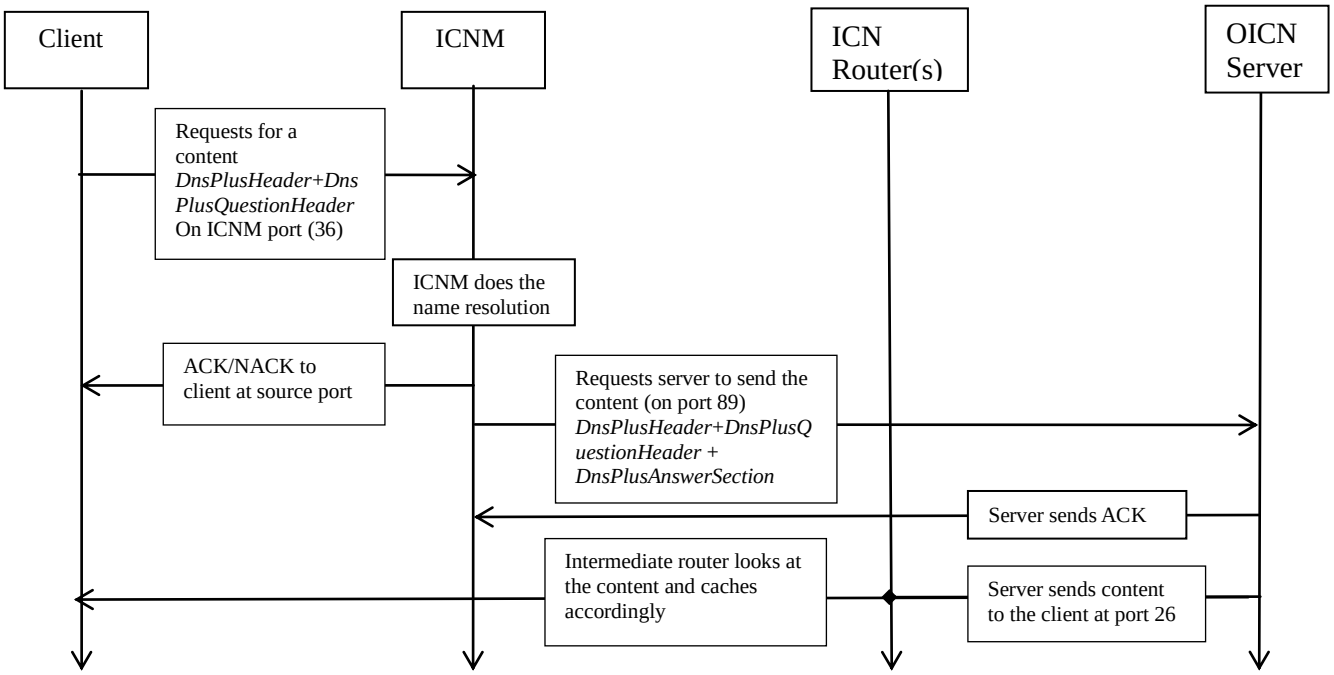
ICN Routers
1. A normal router patched with ICN functionalities.
2. It caches the ICN contents (packets having OICN sublayer [1]) passing through it.
3. It updates ICN Manager, if there is any change in its cache store.
4. It listens to the content requests from the ICN Manager at port 89.
5. It sends cached content corresponding to the name requested to the client and also sends corresponding acknowledgement to ICN Manager.

OICN Server
1. It hosts the contents which are identified by the unique names.
2. It listens to the content requests from the ICN Manager at port 89.
3. It sends content corresponding to the name requested to the client and also sends corresponding acknowledgement to ICN Manager.

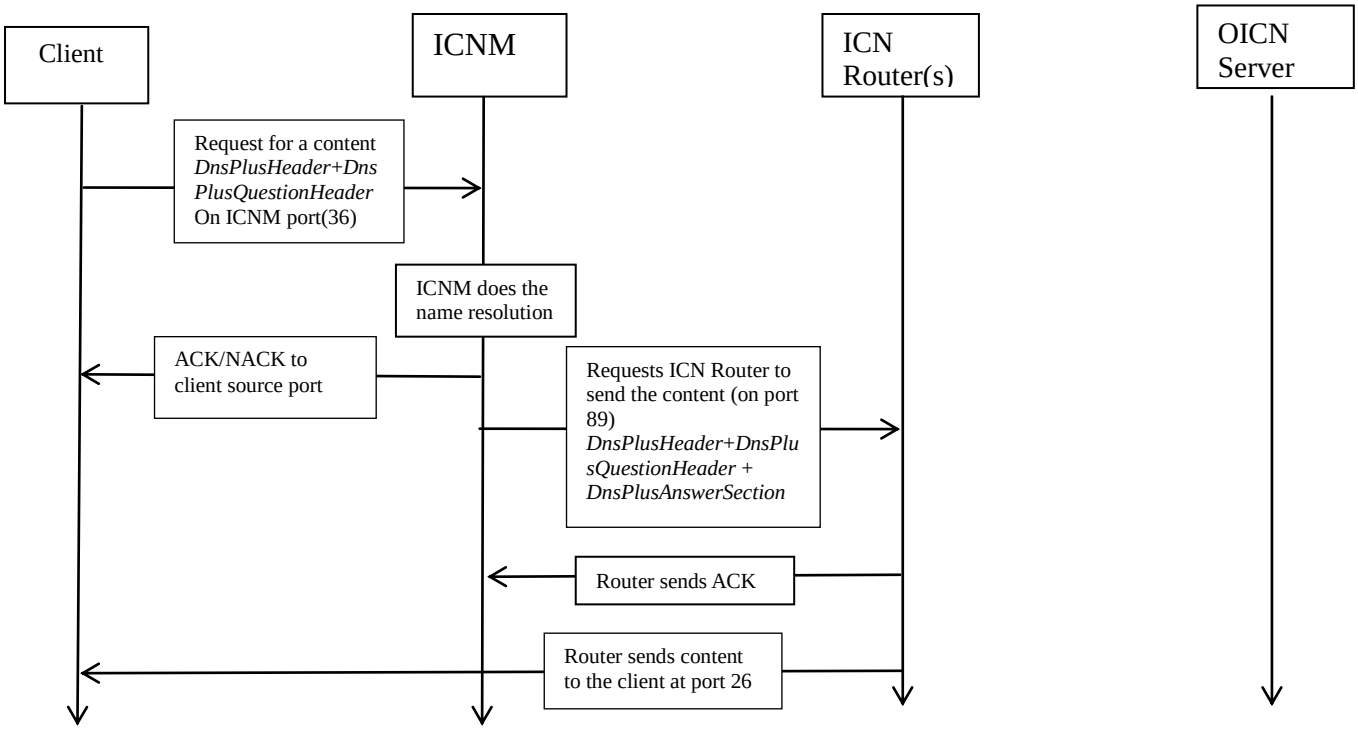
[1] ICNM in real deployment can work standalone or may coincide with DNS server or SDN controller.

High Level Timing diagram for ICN Request Flow:

Case I: In this diagram we have shown the case, where a client is requesting for the content which is not cached in the router. So the content request is redirect to server which ultimately serves the request to the client. In the path intermediate ICN router caches the ICN content.



Case II: In this diagram we have shown the case, where a client is requesting for the content which has been already cached in the router. So the content request is redirect to router which ultimately serves the request from its cache to the client.



Publications:

[1] S. Shailendra, B. Panigrahi, H. K. Rath, and A. Simha, "A Novel Overlay Architecture for Information Centric Networking," in 21st IEEE National Conference on Communications (NCC), pp. 1–6, 2015.

[2] "Providing Requested Content in an Overlay Information Centric Networking (O-ICN) Architecture", US Patent (Patent Filing number# 14/693949)

[3] Bighnaraj Panigrahi, Samar Shailendra, Hemant Kumar Rath, Anantha Simha, "Universal Caching Model and Markov-based Cache Analysis for Information Centric Networks", Journal of Photonic Network Communications, vol 30, issue 3, pp: 428-438, December 2015.

[4] Samar Shailendra, Senthilmurugan Sengottuvelan, Hemant Kumar Rath, Bighnaraj Panigrahi, Anantha Simha, "*Performance Evaluation of Caching Policies in NDN - an ICN Architecture*", IEEE TENCON, Nov. 2016.

[5] Samar Shailendra, Bighnaraj Panigrahi, Senthilmurugan Sengottuvelan, Hemant Kumar Rath, Anantha Simha, "*Distributed Optimal Caching for Information Centric Networking (ICN),*" 27th IEEE Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Sep 2016.

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You can site us as:

S. Shailendra, B. Panigrahi, H. K. Rath, and A. Simha, "A Novel Overlay Architecture for Information Centric Networking," in 21st IEEE National Conference on Communications (NCC), pp. 1–6, 2015.

Suvrat Agrawal, Samar Shailendra, Anirudh Morabagal, Bighnaraj Panigrahi, Hemant Kumar Rath, Anantha Simha, "Overlay ICN Simulator (OICNSIM)," https://github.com/TCS-Research/OICNSIM.