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POF-ICN based multihoming transmission framework
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Abstract

This document presents a POF-ICN based multihoming transmis framework.POF is an SDN forwarding plane technology proposed Huawei,we use it to enable information-centric networking (I The purpose of the framework is to provide an overall pictur the multihoming transmission system.we first describe the relationships among the various components of mobile network the newly added entities, such as Mobility management and Se management.Then we describe the Multihoming transmission op flow to to outline what each components needs to accomplish how these components and mechanisms fit together.

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1. Introduction

Software-Defined Networking (SDN)[RFC7149] gives operators programmatic control over their networks. In SDN, the contro is physically separate from the forwarding plane, and one co plane controls multiple forwarding devices. In SDN, a common vendor-agnostic interface between the control plane and the forwarding plane, which may contain forwarding devices from different hardware and software vendors, is required. OpenFl such an interface.

Huawei presents the Protocol Oblivious Forwarding (POF) tech Base on openFlow. The basic idea is to denote any protocol f as well as the metadata, which is considered as one special protocol header that can be configured by the controller, wi triad of <type, offset, length>.POF also defines a set of pr oblivious forwarding actions/instructions. The actions/instr can realize the functions of all forwarding instructions/act defined in OpenFlow, not only for the existing protocols but for any new protocols.With the protocol oblivious data plane are composed of POF forwarding devices,we will use POF to en information-centric networking (ICN).In the following conten will use POF-ICN to refer to it.

On the other hand,Multihoming support on IP hosts can greatl
improve the user experience. With the simultaneous use of mu
access networks, multihoming brings better network connectiv
reliability,and improved quality of communication.compared t
tcp/ip network,we will discuss how to realize multihoming in
ICN.

1.1 Treminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHAL
"SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL"
this document are to be interpreted as described in RFC 2119
[RFC2119].

Software-Defined Networking (SDN) - A programmable networks
approach that supports the separation of control and forward
planes via standardized interfaces.

Forwarding Plane (FP) - The collection of resources across a
network devices responsible for forwarding traffic.

Control Plane (CP) - The collection of functions responsible
controlling one or more network devices.CP instructs network
devices with respect to how to process and forward packets.
control plane interacts primarily with the forwarding plane
a lesser extent, with the operational plane.

Protocol Oblivious Forwarding (POF) - The protocol that is p
by Huawei to provide a new way to develop SDN.

2. Framework Benefit

To provide better multi-homed transmission services, POF-ICN
support for multi-hosting is reflected in the following aspe

2.1 Forwarding speed

Forwarding speed of the forwarding plane is fast and the forw
path is controllable. Under the POF-ICN architecture, the con
plane is separate from the forwarding plane. The forwarding p

only responsible for simple flow table matching and data pack
forwarding, which greatly eases the switch processing burden.
Compared to the traditional TCP/IP architecture.Therefore, pa
forwarding is faster than traditional networks. On the other
the flow entry on the switch is delivered by the POF controll
that the forwarding path can be controlled.multiple paths can
used conveniently under multihoming scenario. In the traditio
network architecture, mutihoming needs to be implemented by u
multiple IP address pairs which is completely uncontrollable.

2.2 Control plane

The control plane can select the optimal content source and
the optimal transmission path. The POF controller in the POF
architecture manages the underlying forwarding devices. Each
controller can obtain the interconnection information of the
switches in its control domain through the virtual layer.it
control the forwarding rules between switch by issuing the f
table.This feature brings great convenience to multihoming
transmission. In scenarios where the user needs multihoming
transmission, the POF controller can calculate the position
content source closest to the user in the network according
topology information. The TCP/IP network can not achieve tha
the TCP/IP network architecture, content can usually only be
acquired via a fixed ip address. In POF-ICN, it is possible
obtain the required content through the network cache.

2.3 Session management

The session management module is introduced.In the POF-ICN, a
session management module is introduced to maintain the requ
connection through the user network address and the request
content name so that it can provide a basis for further
optimization of the algorithm. In the POF-ICN multihoming
transmission scenario, the session management obtains connec
information through the POF controller.it will use optimizat
algorithm to obtain the optimal forwarding strategy . Finall
best solution to the solution is fed back to the controller.
controller controls the underlying switch Forwarding rules t
maximize link utilization in multihoming transmissions.

3. Framework overview

This document provides a POF-ICN multihoming transport framew shown in Figure 1. In addition to the existing network entiti (such as base stations and mobile gateways, POF switches, etc some logical entities are defined, namely Mobility Management (MME), POF controller, and session management.

Mobility management is responsible for the management of term and hosts. Each time the terminal starts a service, it intera with the MME to obtain multiple available hosts and MME will allocates access bandwidth. When it leaves, it will log out a MME and release the bandwidth. The MME will update the networ

conditions in real time, such as available bandwidth, availab hosts, access terminals, and so on.

Session management is responsible for the management and transmission control of all multihoming services. The session management firstly completes the access bandwidth allocation resource management) through the interaction between the MME terminal on the access side , then the controller completes p planning and path bandwidth resource allocation on the ICN ne side. Session management implements a dynamic decision model randomly estimating the transmission rate and the transmissio delay at both ends of the access switch and the content sourc switch.

The POF controller is responsible for the transmission path p According to the session management, a plurality of parallel from the request side to the content source are planned for t current network resources allocated by the multi-homed servic the path planning is implemented by issuing a flow table to t switch of the forwarding plane.

4. Operation flow

The terminal in this example is equipped with WLAN and LTE interfaces and is also equipped with multihoming features. It connect base stations and wireless POF switches The transmiss steps are as follows:

Step (1): The terminal is connected to multiple hosts such as
and an LTE network.

Step (2): The host will register the access to the MME with t
and update it regularly

Step (3): When the terminal has service requirements, it need
report the service request first. Through the different acces
networks, the current quality of service, network status, rep
to the MME; At the same time, the MME will periodically recei
load of the cellular base station, Wi-Fi access point;

Step (4): After receiving the request, the MME considers the
different transmission characteristics of multiple wireless n
and the respective network load conditions, and reasonably al
the services and resources among multiple networks, and sends
resource allocation plan to the base station and The access p
which simultaneously sends the distribution plan to the sessi
management module of the control plane

Step (5): The controller obtains the host and bandwidth alloc
for the terminal from the session management office,and parse
location of the content source (possibly multiple), and combi
above information to plan multiple paths between the terminal
content source in the network topology. It will send the res
the session management module.

Step (6): According to the result of the bandwidth allocation
session management module establishes a dynamic decision proc
according to the service requirements.it calculates an end-to
multi-path transmission strategy, and invokes the controller
create a flow table.

Step (7): The controller delivers a flow table to the forward
plane

Step (8): When the terminal moves or the network is abnormal,
session management cooperates with the MME and the controller
update the access host and the transmission path

Step (9): update and deliver new flow tables

5. Security Considerations

The mechanism described in this document does not raise any n
security issues for the PCEP protocols.

6. IANA Considerations

This document includes no request to IANA.

7. Conclusion

We describe the framework of our system. At the same time,we
describe the function of each module.

8. References

8.1 Normative References

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