Open issues in InterdomainRouting a survey.(Paper-summary)

Submitted by: Sanjeev kumar, Roll no.:201306647
Anand kalburgi, Roll no.:201305648

Abstract:

Aim of this paper is to introduce and describe challenges in interdomain routing in a comprehensible manner, along with a review of the most compelling contributions and ongoing research efforts addressing each of the exposed issues. It also present perspectives on why these issues remain largely unsolved, and point out why some of the proposals made so far have not yet been adopted.

1. Introduction:

At present, interdomain routing is considered a challenging research area,mainly because of the following two facts:

1) The interdomain routing protocol currently used in the Internet has several limitations, but its replacement is not a realistic option due to its worldwide deployment.
2) Diversity of interests and lack of cooperation between the Domains composing the Internet, for dealing with these issues.

2. The basics of interadomain routing:

Today, the Internet is basically the interconnection of more than 20000 Autonomous Systems(ASes).
An AS is in fact a network or a group of networks under a common routing policy, and managed by a single authority.
The protocol that are used for exchange of routing information within the AS is known as intradomain routing protocol.On the other hand, interdomain routing focuses on the exchange of routes to allow the transmission of packets between different Ases.
The Internet is composed by three different types of ASes:
(i) Single-homed stub Ases:
ASes connected to a single AS .
(ii) Multihomed stub ASes:
ASes connected to a many ASes .
(iii) Transit ASes:
These ASes are also referred to as the Internet core.

BGP is used to exchange reachability information throughout the Internet and it is mainly an inter-AS routing protocol. However, the reachability information that an AS learns from the exterior needs to be distributed within the AS so that every routers in the AS could properly.

3. Research challenges in interdomain routing:

A. Slow convergence and chattiness of BGP:

An important performance metric for a routing protocol is its convergence time, i.e. the time required to reroute packets around a failure. The convergence of BGP was very slow. This slow convergence is caused by several factors, some of which are inherent to the utilization of path vectors by BGP, while others are due to implementation choices.

B. Scalability problems due to Multihoming:

BGP routing tables are growing significantly fast, which imposes a considerable pressure on the scalability of BGP. Load balancing and poor aggregation is the main reason for this fast growth of BGP routing tables.

C. Expressiveness and Safety of Policies:

Lack of global coordination between the policies used in the different domains is a major weakness of the current interdomain routing paradigm. Such independent policies may lead to global routing anomalies, such as inconsistent recovery from link failures or even route oscillations.

D. Robustness of BGP Sessions:

Despite of being supported by TCP connection, resilience of BGP session is formerly affected by congestion.

E. Security Issues:

There are two types of security issues with the current interdomain routing architecture and the BGP protocol.

The first type of security issues are the possible attacks to the transmission of BGP messages by legitimate routers.

The second type of security issues are related with the lack of authentication in BGP.

F. Lack of Multipath Routing:

Since the routing protocol only uses one best route, load balancing is not feasible even between paths presenting the same AS-path length. Even if some vendor implements load balancing multipath extensions in their BGP implementations only the best route is still advertised to other peers in both implementation.

G. Transit through an AS: iBGP issues:

iBGP suffers major performance drawbacks and anomalies such as deflection, routing loops, when the forwarding tables are not perfectly synchronized can occur, especially in the event of a link or a router failure with Pervasive BGP.

H. Limited Traffic Engineering Capabilities:

The current interdomain routing model offers scarce TE capabilities for a number of reasons. First, BGP was designed as a protocol to distribute reachability information. Second,as exposed in section *F* the inability of BGP to advertise multiple routes for the same destination limits the number and quality of the alternative paths that could be used to reroute packets around a failure. In addition, the limitation of BGP in terms of multipath routing restricts the possibilities of balancing traffic across domains to certain setups and vendor specific implementations.

I. Lack of QoS support:

BGP has not inbuilt QoS capabilities since it was designed as a protocol to only distribute reachability information. This creates an issue for the ISP's that wish to provide Qos capabilities to its customer for applications as Voice over IP.

4. Conclusions and Lesson learned:

While some of the issues exposed in this paper are rooted in the intrinsic limitations of BGP and the current interdomain routing architecture, others derive from the intricate interactions and dependencies between domains.

Rather than tackling these issues one by one and in an isolated manner, we need to thoroughly understand their relationships and dependencies if we expect to make any real progress in the area.

An alternative in the long term could be to gradually replace BGP or even the whole Interdomain routing paradigm.