

# Enhanced Accessibility for DNS Service in ASNET-AM Network

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## ABSTRACT

This paper describes the steps taken in the Academic Scientific Research Computer Network of Armenia (ASNET-AM) to improve the accessibility of Domain Name System (DNS). The goal is to achieve redundant distributed DNS Service. Solutions provided are applicable to any network, having more than one external link.

## Keywords

Networking, DNS, Domain Name System, Zone, Resolving, Delegation, Server, Nameserver

## 1. INTRODUCTION

The Academic Scientific Research Computer Network of Armenia (ASNET-AM) is the National Research and Education Network (NREN) of Armenia. Created in 1994 and having over 20 years of experience in Networking and Information Technologies, ASNET-AM [1] provides various networking solutions to the Academic, Scientific, Research, Educational, Cultural and other organizations of Armenia, which are engaged in scientific and educational activity.

Taking into account the fact, that ASNET-AM continuously is striving to have redundant network connectivity, DNS Service needs to be implemented as a distributed system, tied to the different available external channels. This way in case of some external channel faults, both external clients and local users will not experience any service fault.

## 2. IMPROVED ACCESSIBILITY FOR DNS

DNS system in ASNET-AM is already made to be distributed [2]. An important step in providing the improved accessibility is to tie different authoritative nameservers (DNS servers) to different Internet/country wide channels. This way any request from both local users and outside clients, requesting any DNS data, located within zones hosted in ASNET-AM will be satisfied.

Redundancy should be reached through placing of different authoritative nameservers to subnets with different routing Border Gateway Protocol (BGP) policies, so that they will become totally independent. Previously ASNET-AM didn't have its own AS number and the routing solutions were implemented in some older ways [3].

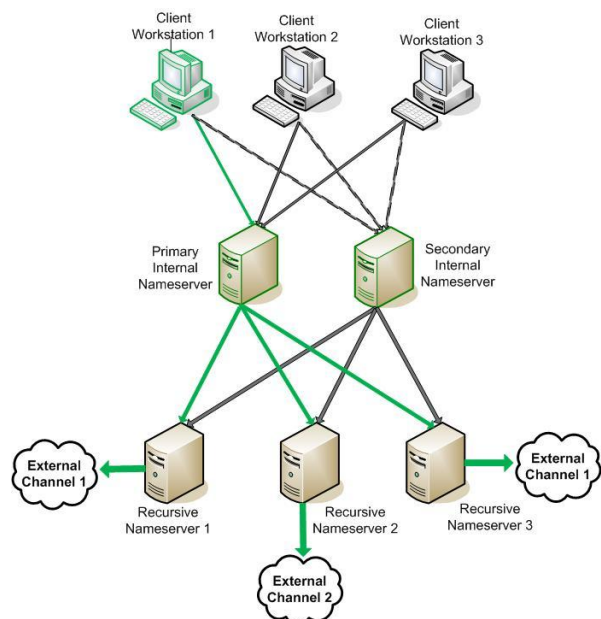
In ASNET-AM case we have two solutions for that. The first is to use the IP addresses of each Telecom Provider, which provides us with an external connection. This solution is good from the real channel independency point of view, since the IP addresses provided by Telecom Provider will be routed within their own AS and this will provide real separation of each channel routing.

Second way is to use the own IP addresses from different prefixes, routed via different Internet/country wide channels. This solution is good from the real provider independency point of view, since in case we would change a provider, we will not need to reconfigure the services, only routing.

We tend to choose the second option in ASNET-AM, since changes of Telecom Provider are not so rare in our case.

Also following the recommendations in [4], we should not combine authoritative and recursive nameserver functions.

Thus the configuration for the distributed DNS system with improved accessibility should be as follows.

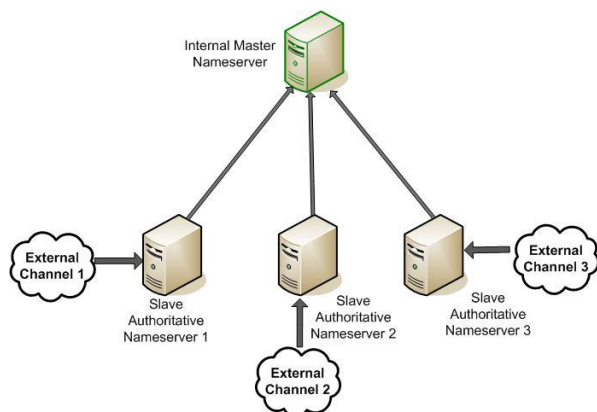


Picture 1 Implementation of Distributed DNS System with Improved Accessibility for local DNS resolving

#### For local DNS resolving (see Picture 1):

- Configure one Recursive Nameserver per available external channel.
- Configure all these Recursive Nameservers to allow serving queries only from two Internal Nameservers (Primary & Secondary).
- Configure Primary & Secondary Internal Nameserver to forward all queries simultaneously to all those Recursive Nameservers.
- Configure Client Workstations DNS settings to use these two Internal Nameservers.

According to the above configuration, each DNS query from Client Workstation, according to DNS settings, will be sent to the Primary Internal Nameserver (Secondary is used in case of failure of Primary). Primary Internal Nameserver will forward this query simultaneously to all configured Recursive Nameservers and after getting the fastest reply, will serve the Client Workstation with it. Improved accessibility in this configuration is being achieved, because Client Workstations DNS settings have no need to be changed in case of temporary failure of any external channel, since they definitely will get a reply from internal nameservers if at least one of the external channels is accessible.



**Picture 2** Implementation of Distributed DNS System with Improved Accessibility for external DNS requests.

#### For external DNS requests (see Picture 2):

- Configure one Slave Authoritative Nameserver per available external channel.
- Register names of these Slave Authoritative Nameservers in NS records for zones, served by ASNET-AM.
- Configure all these Slave Authoritative Nameservers to get zones, served by ASNET-AM from single Internal Master Nameserver, not accessible from the outside.

According to the above configuration, each DNS query from outside for zones, served by ASNET-AM, will be sent to one of the Slave Authoritative Nameservers according to NS records. Improved accessibility in this configuration is being achieved, due to Round-robin DNS technique, so that in case of temporary failure of any external channel zone data will be definitely served to external clients if at least one of the external channels is accessible.

Additional security configuration settings should be implemented as described in [5].

### 3. CONCLUSION

Redundant distributed DNS Service with improved accessibility can be implemented by separating authoritative and recursive nameserver functions, creating one recursive nameserver per available external channel for local DNS resolving and one authoritative nameserver per available external channel for serving outside requests to zones, served by ASNET-AM.

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