Course: Computer Networks
Assignment 6

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(The homework was discussed with Dragi Kamov, Brian Sherif, and Yiping Deng)

Problem 6.1

a) When trying to resolve grader to an IPv6 address, the following steps take place:
First, a DNS query is sent to the DNS recursive resolver. The query requested the AAAA records for Grader. The local DNS resolve returns 13 root server, then 6 de. top level domain nameservers, of which s.de.net is choosen for which the next subdomain jacobs-university.de.. This then leads us to select www.jacobs-utils.de. out of 2 available nameservers before proceeding to the next subdomain eecs.jacobs-university.de. we then receive 3 nameservers at this level, of which we proceed with dns.jacobs-university.de which then allows us to lookup the AAAA record of Grader. All this was completed using dig +trace grader.eecs.jacobs-university.de AAAA of which a txt file is available in the folder of this homework.

b) It is defined in RFC 2782. It is used to identify servers that host specific service with a specific protocol.

Proto: Given name of the protocol.

Name: The domain referred to by the RR.

TTL: Time To Live

Class: A namespace provided to a protocol.

Priority: This is the priority of the target host which ranges from 0 to 65535.
Note: A client should try to reach the target host with the lowest priority and if there are similar priorities, then they sha;; be ordered in place by their weight field.

Weight: This field specifies a relative weight for entries with the same priority (The larger the weight then the higher priority it gets). This is a server selection mechanism is a 16-bit unsigned integer in network byte order with a range from 0 to 65535.

Port: the port on the target host of this service which is written as a 16 bit unsigned integer in network byte order with a range of 0 to 65535.

Target: This is the domain name of the target host. It is important that the name is not an alias and that there is at least one record for this name . It is prefered to return the address record in the Additional Data section. Name compression is not possible in this field.

Example of a SRV resource
_ldap. _tcp.example.net. 3600 IN SRV 0 0 389 phoenix.example.net. 2

c) No, due to the difficulty and complexity of its implementation which would cause security issues.

   Bad: Security issues such as Denial of Service Attacks and DNS spoofing.
   Due to the fact that it can be served on any port it can bypass censorship filters as well as firewalls.
   Good: It can help achieve load balancing. Which saves on infrastructure cost for website owners.
   In addition, given that it can help redirect traffic to different domains it allows better design for web services.

d) EDNS0 can be found in RFC 2671
   EDNS0 is the extension of the size of the parameters in the DNS protocol which had size restrictions that previously limited the protocol.
   This gives the DNS clients the ability to advertise up to 4096 bytes of UDP packets.
   The Class field indicates the sender largest UDP payload.
   TTL indicates the extended RCODE and flags, which is used to indicate its implementation level.

Problem 6.2

a) Multicast Domain Name System (found in RFC 6762) is used to resolve hostnames to IP-addresses in small networks which do not have local name servers. It is similar to Unicast Domain Name System since they both use the same operating semantics and packet format.
   What makes it different is that it lacks the Start of Authority record. In addition, it uses UDP port 5353.

b) DNS-Based Service Discovery found in RFC 6763, is a mechanism which clients can use to discover a list of named instances of a desired service, using standard DNS queries.
   PTR Records: When including either a Service Instance Enumeration or Selective Instance Enumeration PTR record in a response packet, the server should contain the The SRV record, the TXT record, as well as all address records the SRV rdata.
   SRV record provide the target hostname as well as the port number of the service location
   TXT record contains information about the named service this can be up to 65535 bytes of information.