



mDNS (ICM3400)

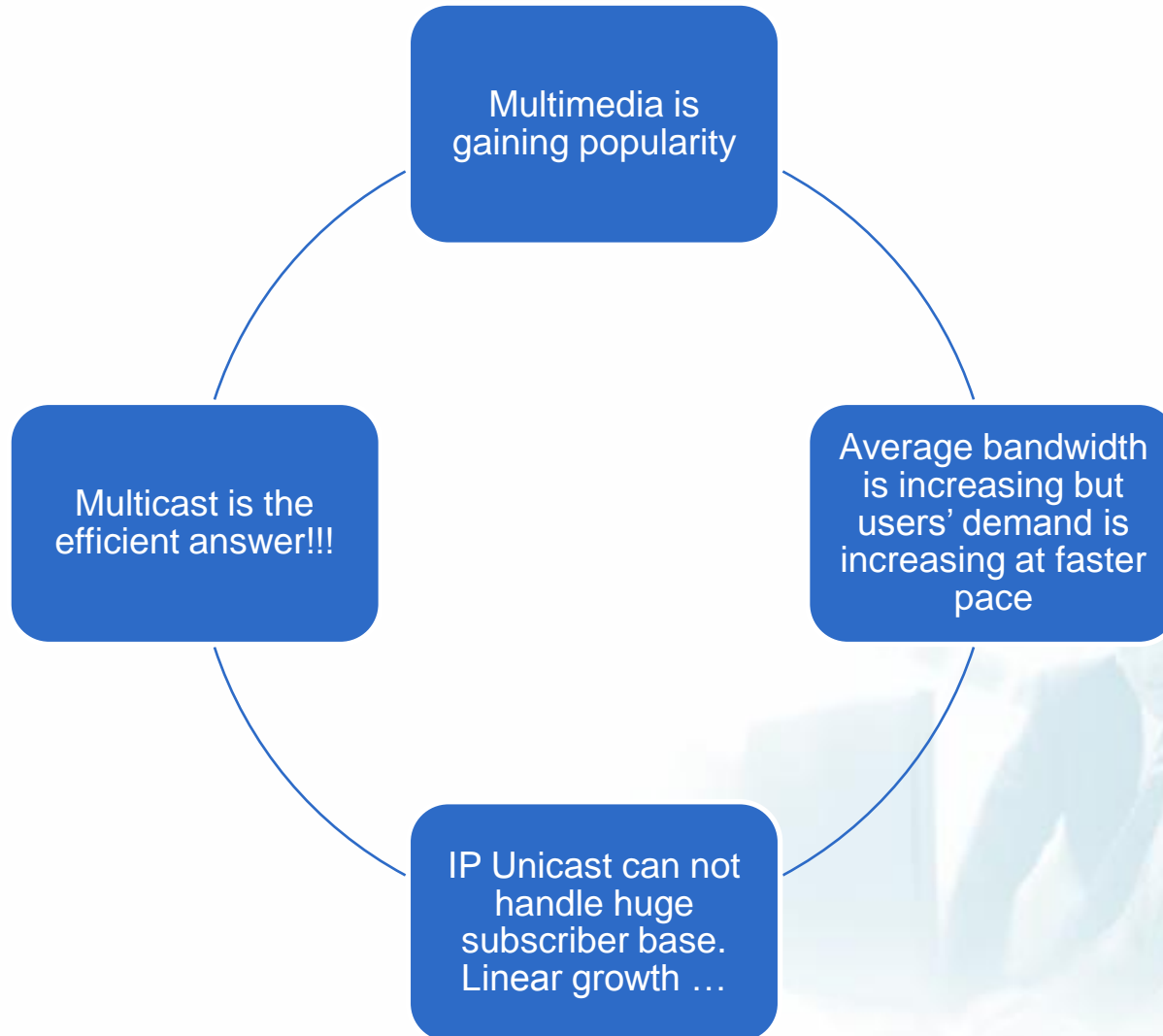
Proposal for Hierarchical Multicast Session Directory Architecture

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Why do we need multicast!





No Universal Deployment?

IP Multicast has been around for a long time. It is just not used much! Why?

No DNS like service exists for IP-Multicast!

- There is no easy way to look up IP Multicast addresses as there are for domain names.

URLs have made IP Unicast usable by the masses!

- Similar URL scheme could help make Multicast usable!





Why do we need a multicast session directory?

For multicast content discovery on the fly

With SSM and IGMP v3, source discovery burden will rest on end users

Integration of multicast session directory with a clever URL design scheme would make multicast more usable for general user community.

Keywords based sessions tagging may provide multi-dimensional and more sophisticated search capability to the end user

This in turn would result in more precise content retrieval in real time.

mDNS – Salient Features

Designed on similar lines of Unicast DNS hierarchy

URL scheme for multicast sessions is proposed

Compared to push-based approaches ours is pull-based design

Hierarchical design and Universal (doesn't depend on ASM or SSM)

Minimizes bandwidth waste due to periodic state refreshes (even at global scale)

Minimizes space wastage

Minimizes latency (on the fly information retrieval)

Does not cache session details at every client nodes as in sdr

Session details are maintained only at domain local servers

mDNS - Architecture

Terminology

MSD_x^y – Multicast Session Directory (MSD) server y in domain x

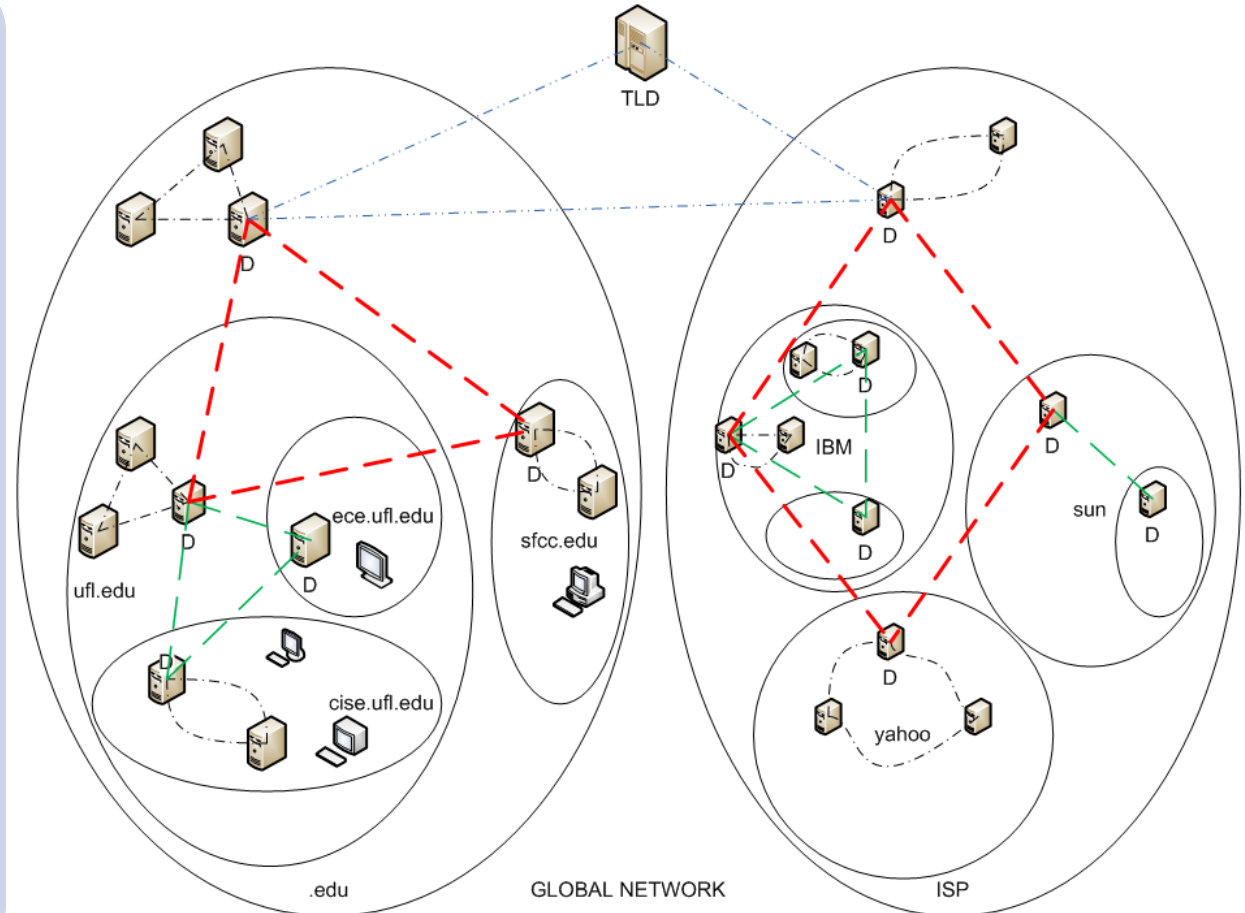
MSD_x^d – Designated MSD server in domain x

DNS_x – Domain name server domain x

URS_x – URL registration server in domain x

MSD-LOCAL-MCAST – Admin. Scoped channel on which all MSD servers in a domain listen to.

PMCAST – Global GLOP channel used to connect designated MSD server with servers in parent's domain.



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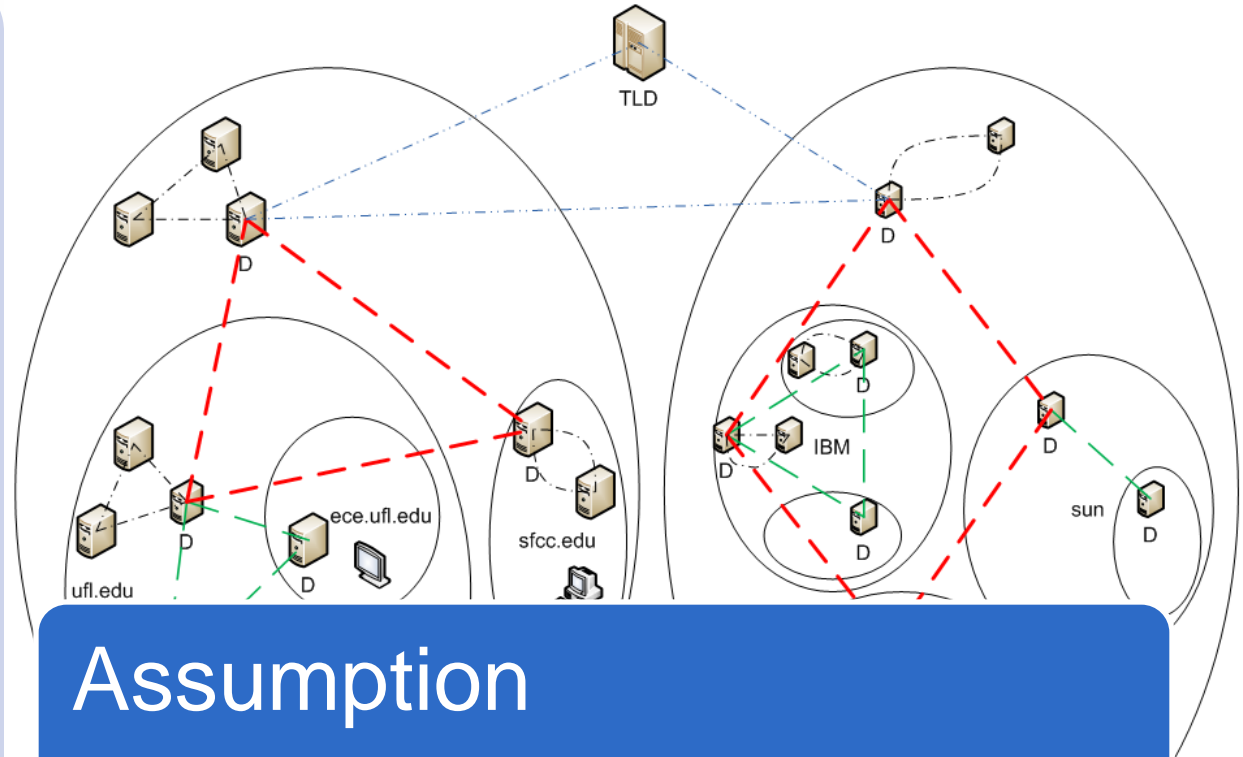
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Assumption

Each domain / sub-domain knows its DNS server address

DNS server knows about its parent DNS server

At least one MSD server coexists with the DNS server at each domain level

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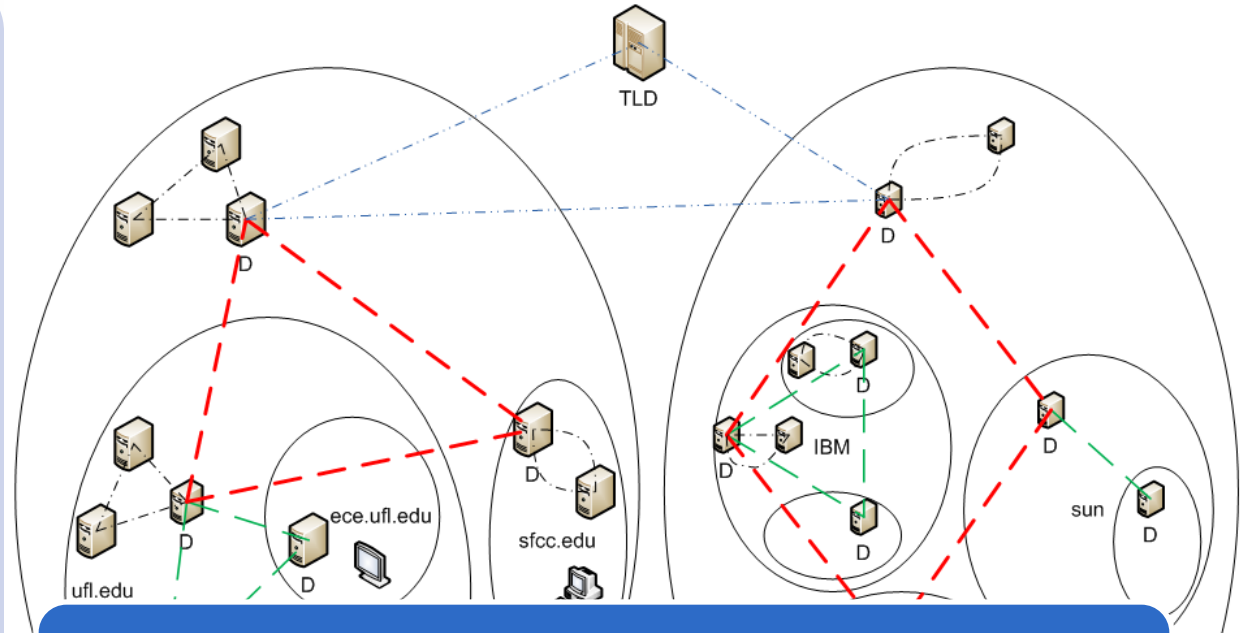
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@MCAST

{

ANYCAST=a.b.c.d

#anycast address of MSD servers in this DNS server's domain

CMCAST=255.[ASN Byte 1].[ASN Byte 2].xyz

#for group formation with child subnets

PMCAST=255.[ASN Byte 1].[ASN Byte 2].pqr

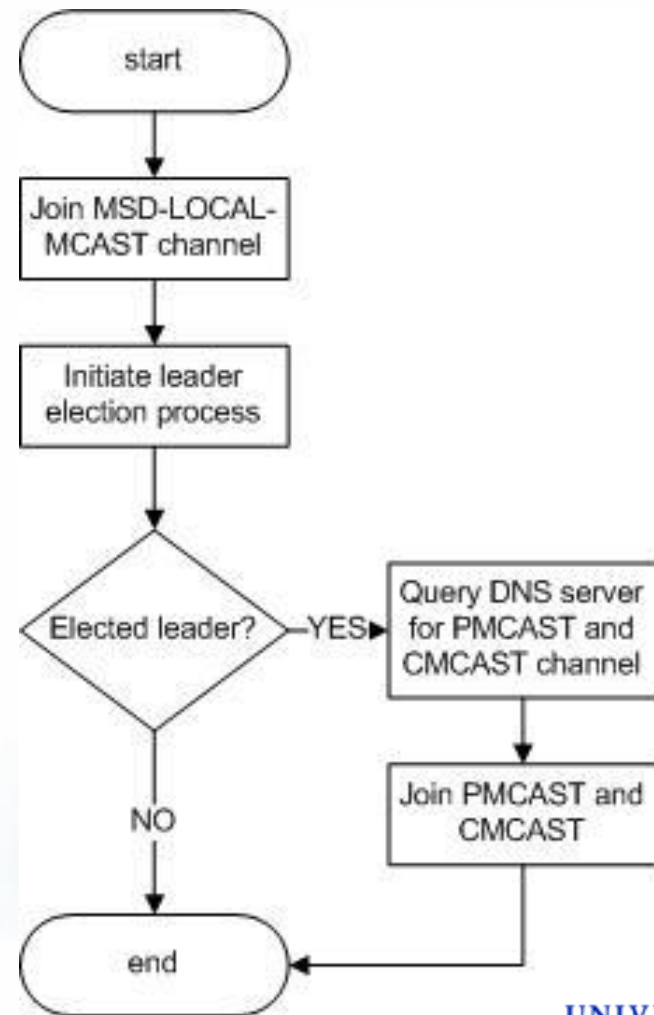
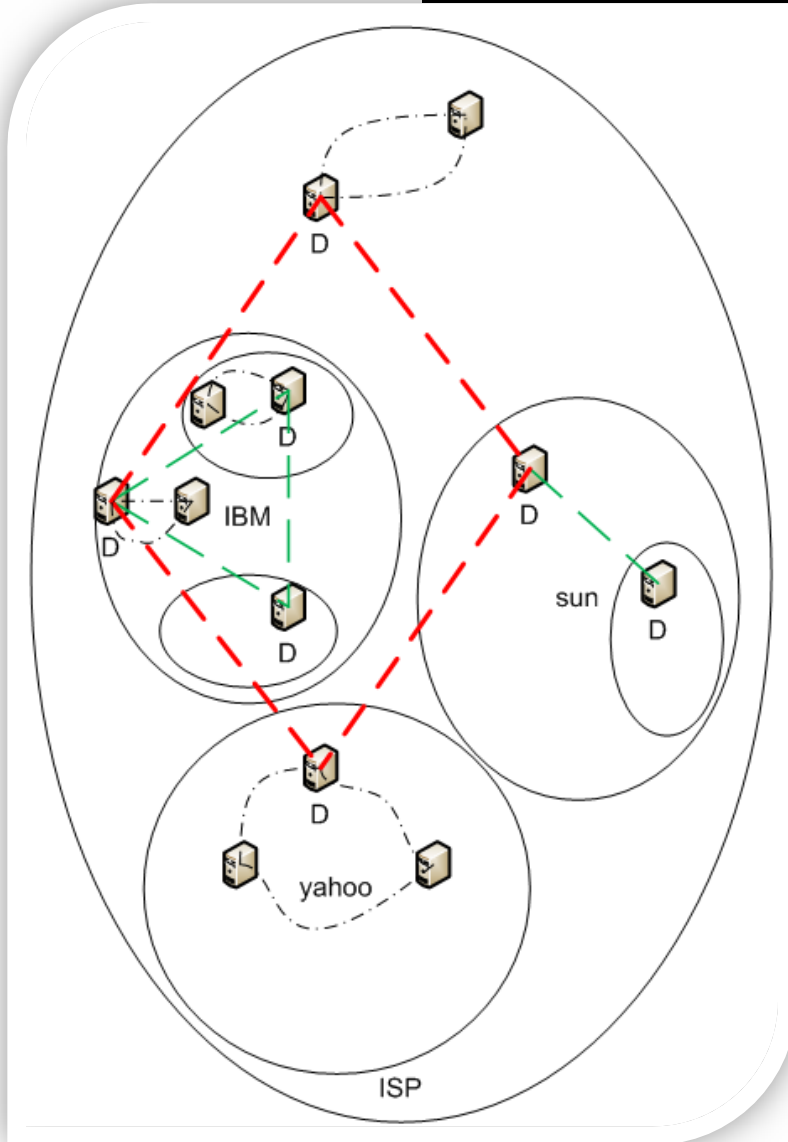
#for group formation with parent domain

URS=x.y.z.w

#address of URS server in this domain (optional)

}

MSD Server Base Algorithm





mDNS URL Design

- In mDNS, sessions can be accessed directly if creator successfully registers keyword with it's domain's URS server.

- mDNS URL syntax

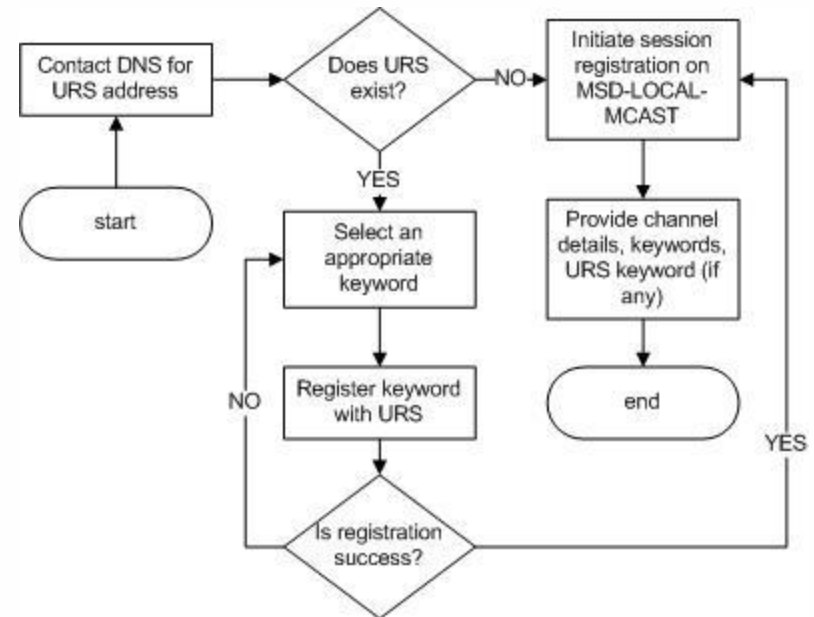
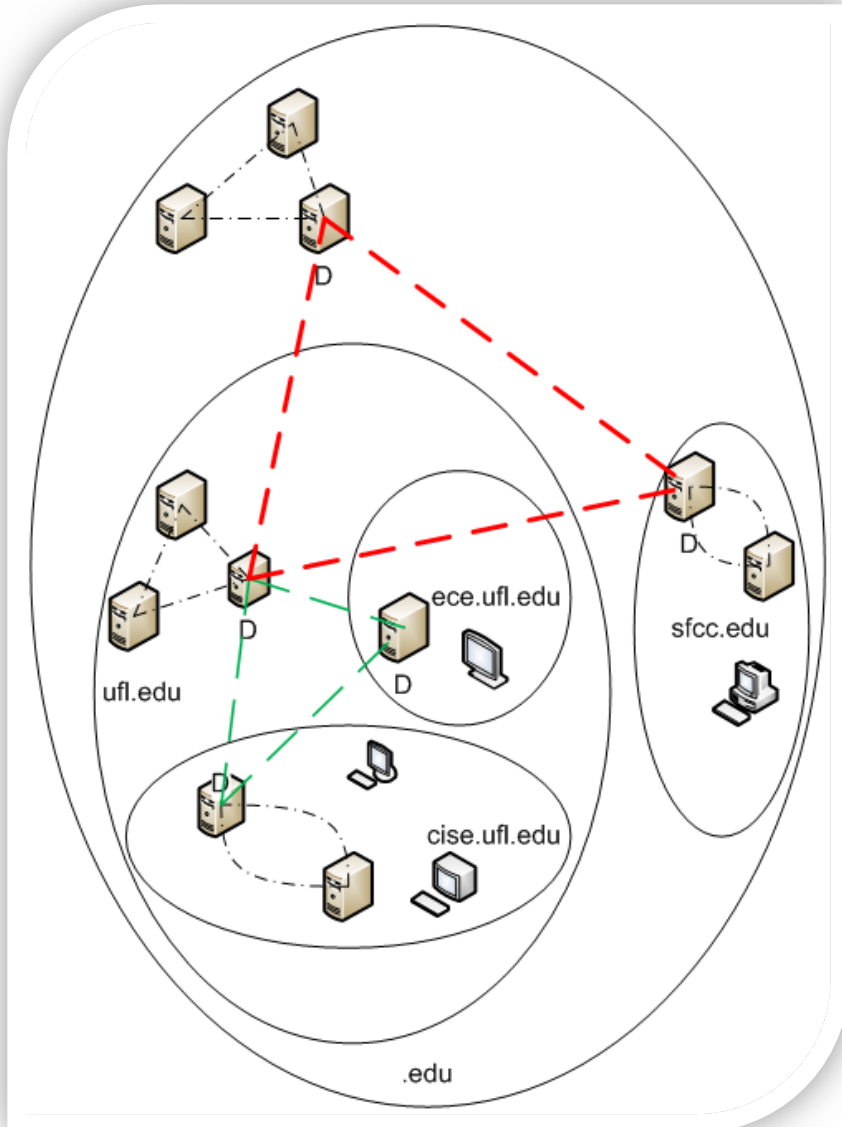
<protocol>://<domain URL>/<URS Keyword>

- Protocol could be http or any valid protocol type
- Domain URL helps resolve MSD server located in the creator domain, it begins with *mcast*.
- Example mDNS URL could be

<http://mcast.cise.ufl.edu/gators>

- This would refer to multicast session hosted under cise domain with keyword 'gators' registered with cise URS server.
- What is returned is the session's details. mDNS capable browser could then launch an appropriate plug-in to display the multicast contents sent on that channel.

mDNS Session Registration



We place no restriction on choice of keywords in our mDNS scheme, hence our scheme can accommodate wide range of multimedia streams and channels.



mDNS - Search

Domain specific search

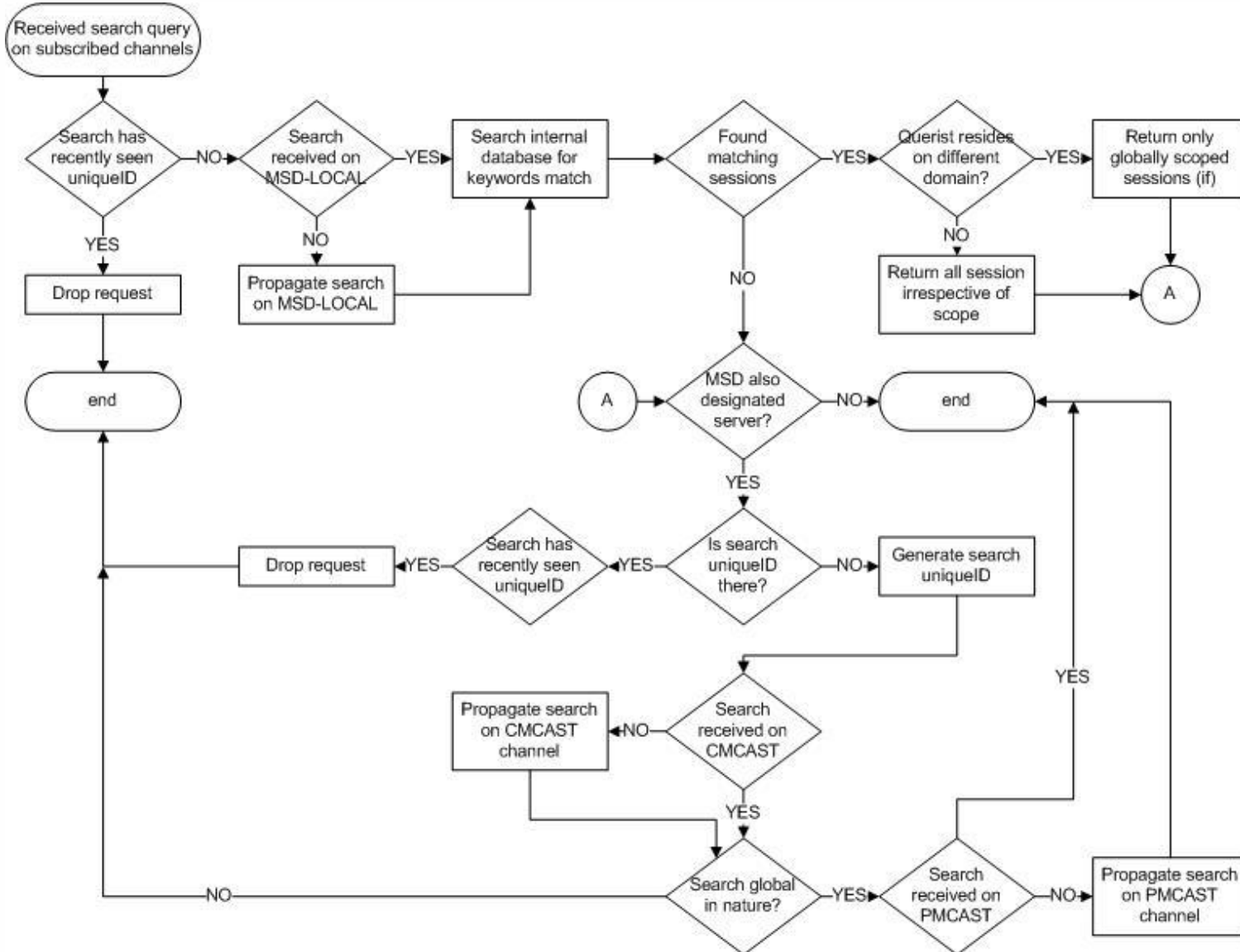
- It can be carried out using mDNS style URLs
- User must use qualifiers 'search' & 'keyword' in the URL String
- An example search URL string
 - mcast.cise.ufl.edu/search=all&keyword=gators
 - search reaches MSD server located in CISE domain
 - It propagates in top-down fashion to all sub-domains under CISE

Global Search

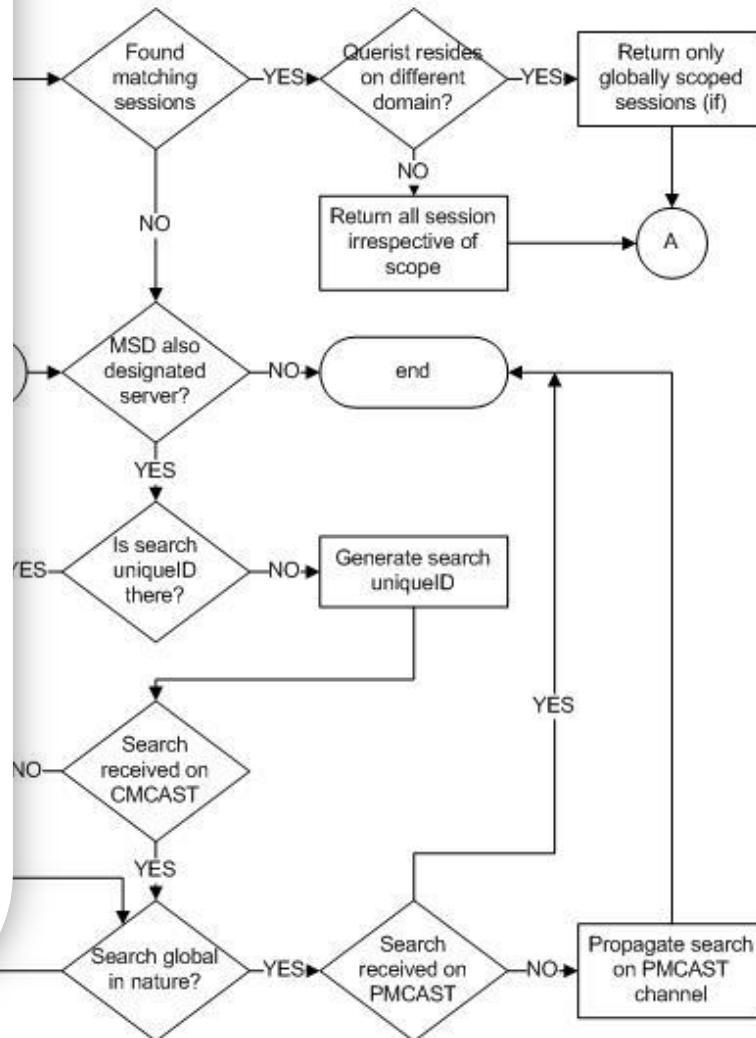
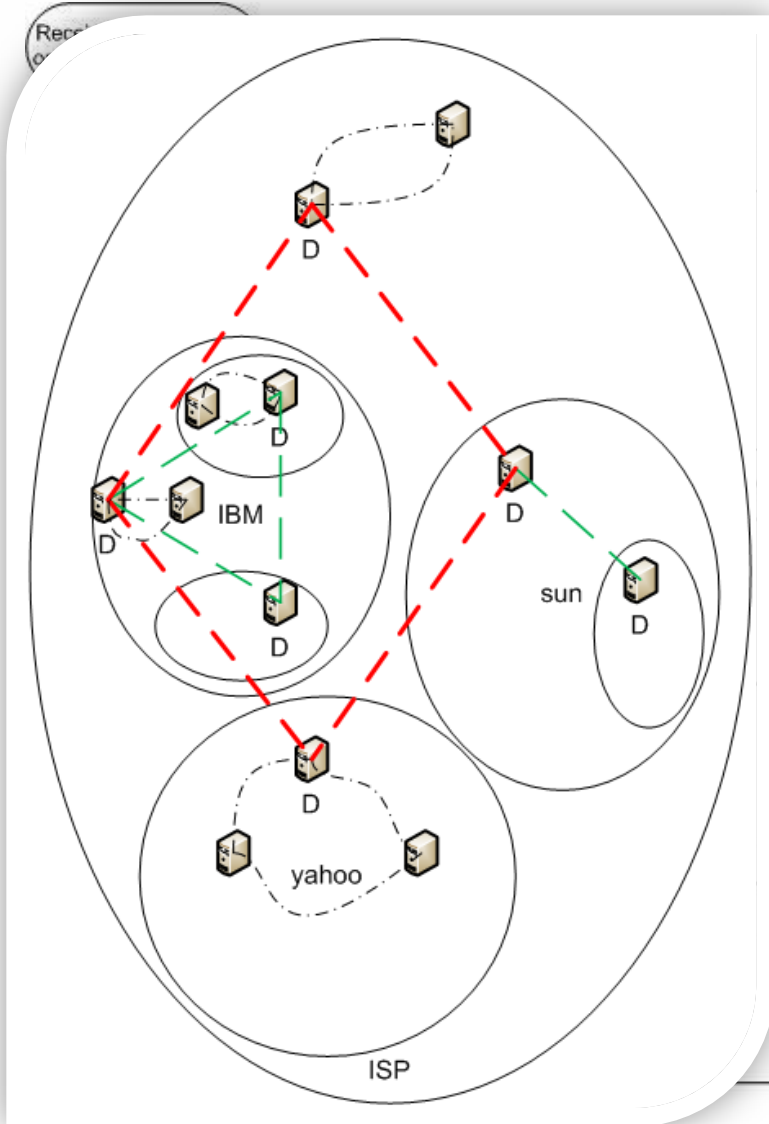
- Originates at the MSD server in the same DNS domain
- It is propagated by MSD servers on PMCAST and CMCAST channels in addition to MSD-LOCAL-MCAST channel
 - This propagation is done by designate MSD servers only
- Originator MSD^d server adds a unique identification tag along with the search query before propagating it on other channels.



mDNS – Search Flowchart



mDNS – Search Flowchart





mDNS Analysis & Conclusion

mDNS URL

- would make bookmarking of popular sessions possible just like html bookmarks.
- Familiar paradigm



Drawbacks

- Vulnerable to DDoS attacks on particular host
 - Because under current scheme, each MSD server responds to search query results directly to the requesting host.
- Global search activates every existing MSD servers
 - Could be addressed by smart placements of intelligent caches



Benefits

- Database space saving – under mDNS, session details are stored only at session's hosting domain MSD server
- We conjecture under mDNS, session query will be much faster compared to session discovery in any sdr based approach.
- Improved usability may lead to increased use of Mcast.

Questions?

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To download latest mDNS modules please visit –
<http://www.cise.ufl.edu/~pharsh/OSS/>

Note: Modules may compile and run but many are in various stages of development!