# prop-163: Enhancing WHOIS Transparency and Efficiency Through Referral Server Implementation

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# Problem statement

The current APNIC WHOIS system does not address the following issues:

- Inconsistent queries after resource transfers:
  - When an ASN is transferred from APNIC to another RIR (e.g., RIPE NCC or ARIN), the IANA database query still points to APNIC WHOIS. This results in missing or incorrect data, requiring users to manually query the appropriate authoritative WHOIS database.

# Problem statement

- Challenges in querying NIR second-level allocations:
    - Some NIRs manage their resource allocation independently.
    - When resources are allocated to their members, the data may be stored only in the NIR's local system.
    - The APNIC database may not reflect these allocations with corresponding updates.
    - The existing WHOIS query mechanism cannot automatically redirect queries to the specific NIR WHOIS database.
    - This situation reduces both transparency and efficiency.

# Problem statement

- Lack of transparency for downstream allocations:
  - When resources are further allocated to end users (e.g., enterprises or other organizations), the current WHOIS system is unable to automatically provide this allocation information.
  - Redirecting queries to customer-maintained servers could significantly reduce communication overhead and improve accuracy.

# $whois 140.113.0.0

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- Sample, 140.113.0.0
- TANet (Taiwan Academic Network) Legacy Resource
- Query -> IANA -> ARIN -> APNIC

```
refer:          whois.arin.net

inetnum:        140.0.0.0 - 140.255.255.255
organisation:   Administered by ARIN
status:         LEGACY

whois:          whois.arin.net

changed:        1993-05
source:         IANA

# whois.arin.net

NetRange:       140.109.0.0 - 140.138.255.255
CIDR:           140.109.0.0/16, 140.112.0.0/12, 140.138.0.0/16, 140.136.0.0/15, 140.128.0.0/13, 140.110.0.0/15
NetName:        APNIC-ERX-140-109-0-0
NetHandle:      NET-140-109-0-1
Parent:         NET140 (NET-140-0-0-0)
NetType:        Early Registrations, Transferred to APNIC
OriginAS:
Organization:   Asia Pacific Network Information Centre (APNIC)
RegDate:        2003-07-14
Updated:        2009-10-08
Comment:        This IP address range is not registered in the ARIN database.
Comment:        This range was transferred to the APNIC Whois Database as
Comment:        part of the ERX (Early Registration Transfer) project.
Comment:        For details, refer to the APNIC Whois Database via
Comment:        WHOIS.APNIC.NET or http://wq.apnic.net/apnic-bin/whois.pl
Comment:
Comment:        ** IMPORTANT NOTE: APNIC is the Regional Internet Registry
Comment:        for the Asia Pacific region.  APNIC does not operate networks
Comment:        using this IP address range and is not able to investigate
Comment:        spam or abuse reports relating to these addresses.  For more
Comment:        help, refer to http://www.apnic.net/apnic-info/whois_search2/abuse-and-spamming
Ref:            https://rdap.arin.net/registry/ip/140.109.0.0

ResourceLink:   https://apps.db.ripe.net/db-web-ui/query
ResourceLink:   whois.apnic.net


OrgName:        Asia Pacific Network Information Centre
OrgId:          APNIC
Address:        PO Box 3646
City:           South Brisbane
StateProv:      QLD
PostalCode:     4101
Country:        AU
RegDate:
Updated:        2012-01-24
Ref:            https://rdap.arin.net/registry/entity/APNIC

ReferralServer: whois://whois.apnic.net
ResourceLink:   https://apps.db.ripe.net/db-web-ui/query

OrgTechHandle: AWC12-ARIN
OrgTechName:   APNIC Whois Contact
```

# $whois 140.110.0.0

```
% Information related to '140.110.0.0/16AS7539'

route:          140.110.0.0/16
origin:         AS7539
descr:          Taiwan Network Information Center
                3F., No. 123, Sec. 4, Bade Rd., Songshan Dist.
mnt-by:         MAINT-TW-TWNIC
last-modified:  2023-11-03T02:34:44Z
source:         APNIC

% Information related to '140.110.0.0 - 140.110.255.255'

inetnum:        140.110.0.0 - 140.110.255.255
netname:        T-NCHC.ORG.TW-NET
descr:          Ministry of Education Computer Center
descr:          12F, No 106, Sec.2,Hoping E. Rd.,
descr:          Taipei Taiwan
country:        TW
admin-c:        AN198-TW
tech-c:         AN198-TW
                MAINT-TW-TWNIC
remarks:        This information has been partially mirrored by APNIC from
remarks:        TWNIC. To obtain more specific information, please use the
remarks:        TWNIC whois server at whois.twnic.net.
changed:        noc@mail.moe.gov.tw 19920502
status:         ASSIGNED NON-PORTABLE
source:         TWNIC

person:         ADMIN NCHC
address:        National Center for High-Performance Computing
address:        7, R&D Rd. VI, Hsinchu Science Park
address:        Hsinchu Taiwan
country:        TW
phone:          +886-3-577-6085
fax-no:         +886-3-577-6082
e-mail:         abuse@nchc.org.tw
nic-hdl:        AN198-TW
changed:        hostmaster@twnic.net 20050502
source:         TWNIC

% This query was served by the APNIC Whois Service version 1.88.25 (WHOIS-JP3)
```

```
# whois.apnic.net

% [whois.apnic.net]
% Whois data copyright terms    http://www.apnic.net/db/dbcopyright.html

% Information related to '140.109.0.0 - 140.111.255.255'

% Abuse contact for '140.109.0.0 - 140.111.255.255' is 'hostmaster@twnic.tw'

inetnum:        140.109.0.0 - 140.111.255.255
netname:        TANET-BNETS
descr:          imported inetnum object for MOEC
country:        TW
admin-c:        ZDL3-AP
tech-c:         ZDL3-AP
abuse-c:        AT939-AP
status:         ALLOCATED PORTABLE
notify:         color@twnmoe10.edu.tw      Expired domain
mnt-by:         MAINT-TW-TWNIC
mnt-irt:        IRT-TWNIC-AP
last-modified:  2021-11-04T00:49:55Z
source:         APNIC
```

# Objective of policy change

- By implementing WHOIS Referral Server support
  - Queries for transferred resources (e.g., ASN or IP addresses) will be automatically redirected to the appropriate RIR database.
  - NIR allocations can be seamlessly queried through a hierarchical system.
  - Downstream allocation information will become accessible, enhancing transparency and traceability.

# Situation in other regions (RIRs)

- AFRINIC: Does not yet support Referral Server functionality and relies on a centralized WHOIS system.
- ARIN: Partially supports referral functionality, allowing queries to redirect to specific databases.
- LACNIC: Operates a centralized WHOIS system without Referral Server support.
- RIPE NCC: Implements similar hierarchical query capabilities and can automatically redirect users to relevant databases.

# Proposed policy solution

- Based on RFC 2167 (Referral WHOIS Protocol Version 1.5), the following improvements are proposed:
- 1. Enable Referral WHOIS Protocol
  - Modify the APNIC WHOIS system to support a Referral Server mechanism as defined by RFC 2167:
    - Allow automatic query redirection to other RIR or NIR databases.
    - Implement a hierarchical and distributed query mechanism to reduce the burden on a single server.

# Proposed policy solution

- 2. Collaborate with NIRs for second-level allocations
  - Standardize interfaces for NIRs to register and expose their allocation data, enabling direct query support.
- 3. Support downstream customer allocations
  - Encourage resource holders (e.g., ISPs) to register detailed downstream allocation information, enabling transparent queries through the Referral Server system.