Allocation & Announcement

How Long before Prefixes are Used? And Who Announces Them

ARIN / Los Angeles

2005.10.26

Randy Bush <randy@psg.com>

ARIN Engineering

<http://rip.psg.com/~randy/051026.arin-alloc.pdf>

Some Questions

- How much delay is there from when an RIR allocates IP space until it is announced in BGP?
- Related Questions:
  - Difference between direct allocations from ARIN and Subs from ISPs
  - Who is announcing, *expected* AS?

Data Sources

- Allocation data from ARIN processed by ARIN
  - To be easy to parse
  - Remove administrative oddities (non-payment suspensions, etc.)
- BGP data from Route Views RIB dumps from 1997 to present

ARIN Data

```
net_handle (needed to differentiate same-sized networks)
start_ip
end_ip
org_id
org_name
start_date (may be null; format is YYYY-MM-DD HH:MM:SS)
end_date
date_last_updated
type

NETfoo|3.0.0.0|3.255.255.255|OrgID|OrgName|1988-02-23 \
   00:00:00||2002-09-26 14:08:54|DS

where type is one of four values:
      DA - direct allocation
      DS - direct assignment
      A - reallocation; able to be further subdelegated
      S - reassignment; no further subdelegation is permitted
```

Route Views Data

```
147.28.0.0 16 3130 2000-02-08 09:40:00 2000-02-08 09:40:00
  prefix  len orig    first-appears       last-appears
```

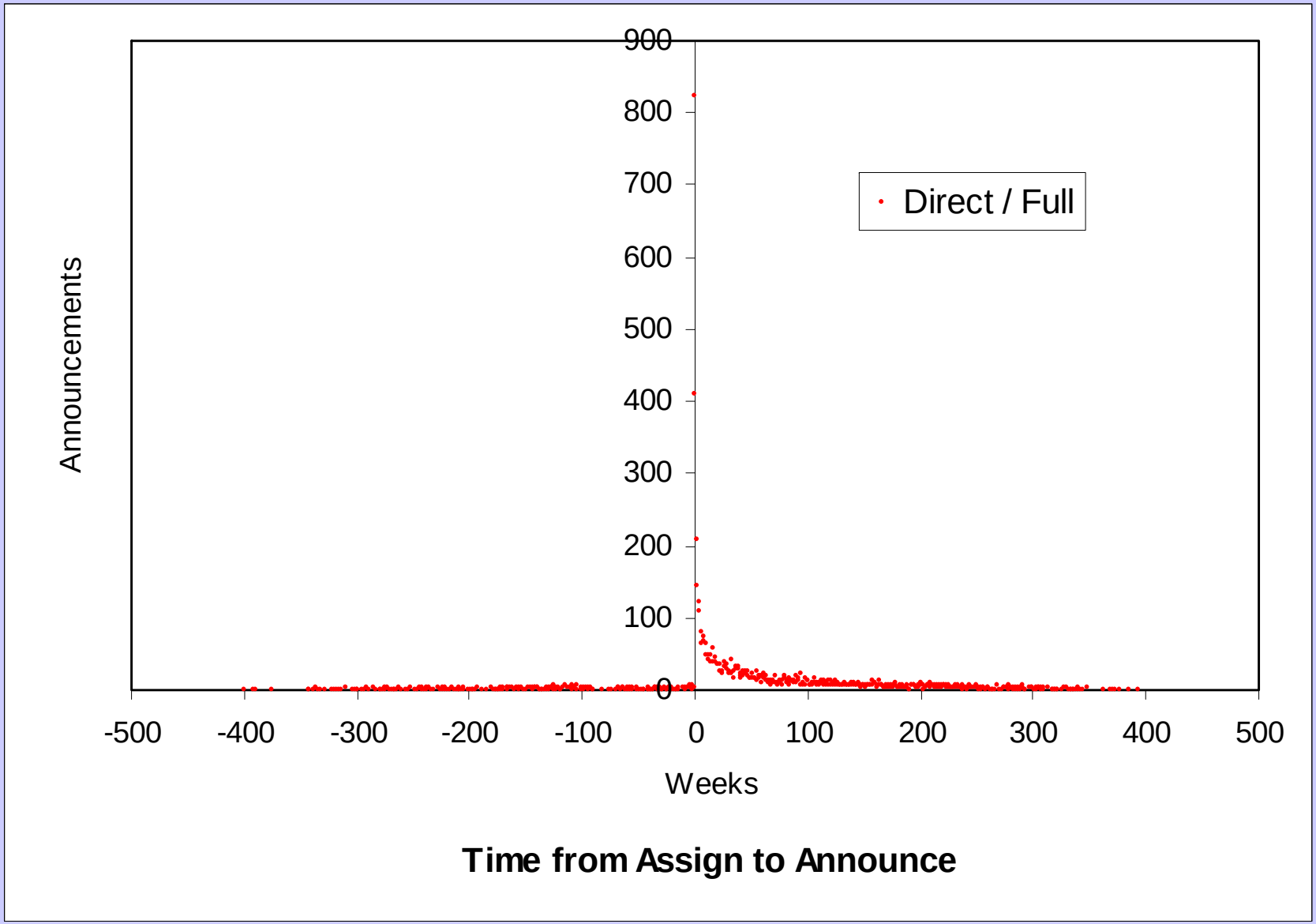
From RIB data

```
* i3.0.0.0    144.232.9.61    4    100      0 1239 701 703 80 i
*>            129.250.11.41   37            0 2914 701 703 80 i
*             199.238.113.9   37            0 2914 701 703 80 i
* i4.0.0.0    144.232.9.61    4    100      0 1239 3356 i
*>            199.238.113.9   37            0 2914 3356 i
*             129.250.11.41   37            0 2914 3356 i
```

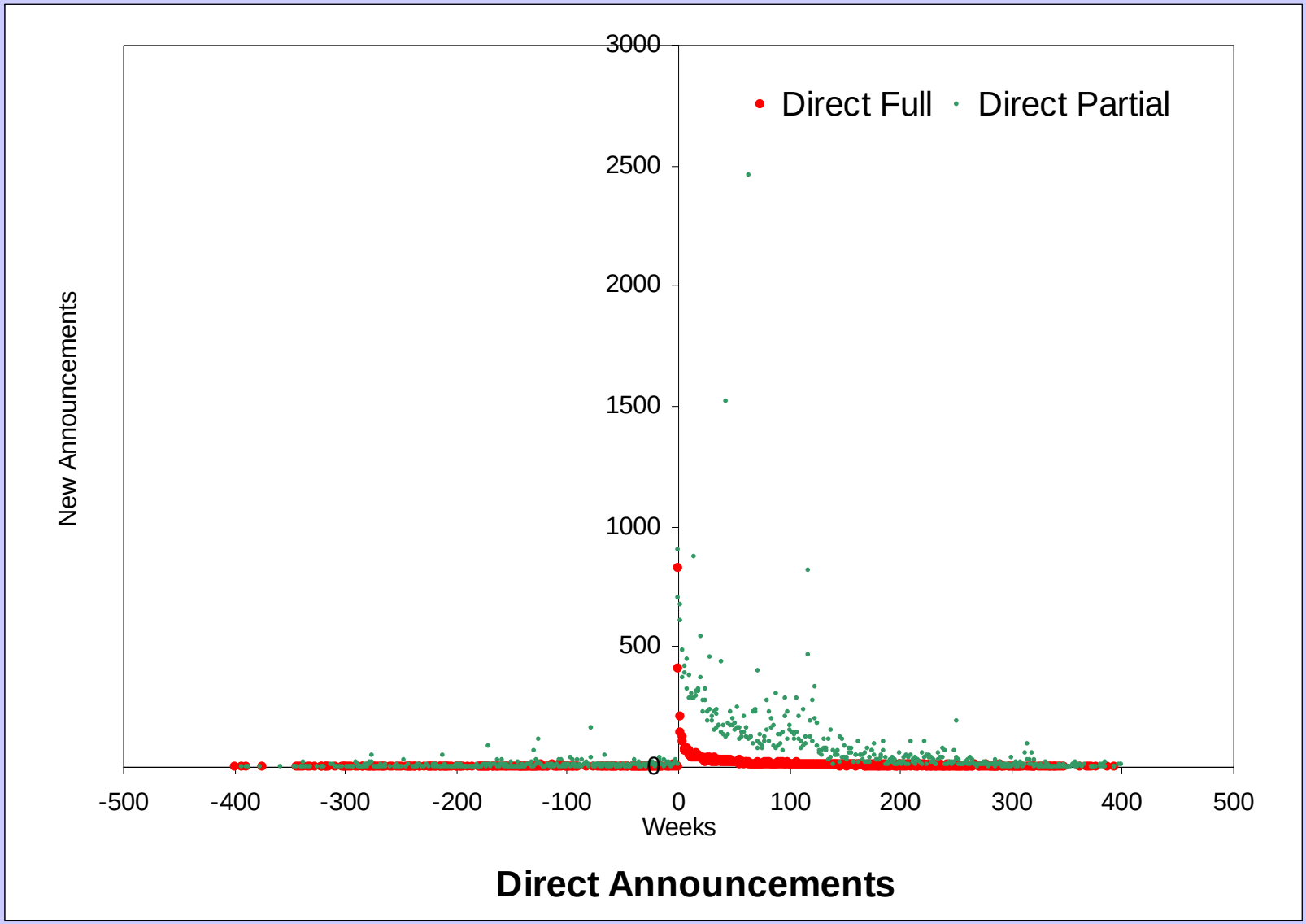
Analysis

- Route Views data run at University of Oregon Route Views complex
- ARIN extraction run at ARIN database complex
- Combined and processed on my laptop
- Analysis done in Python, I needed to learn a new language
- Python ROCKS!

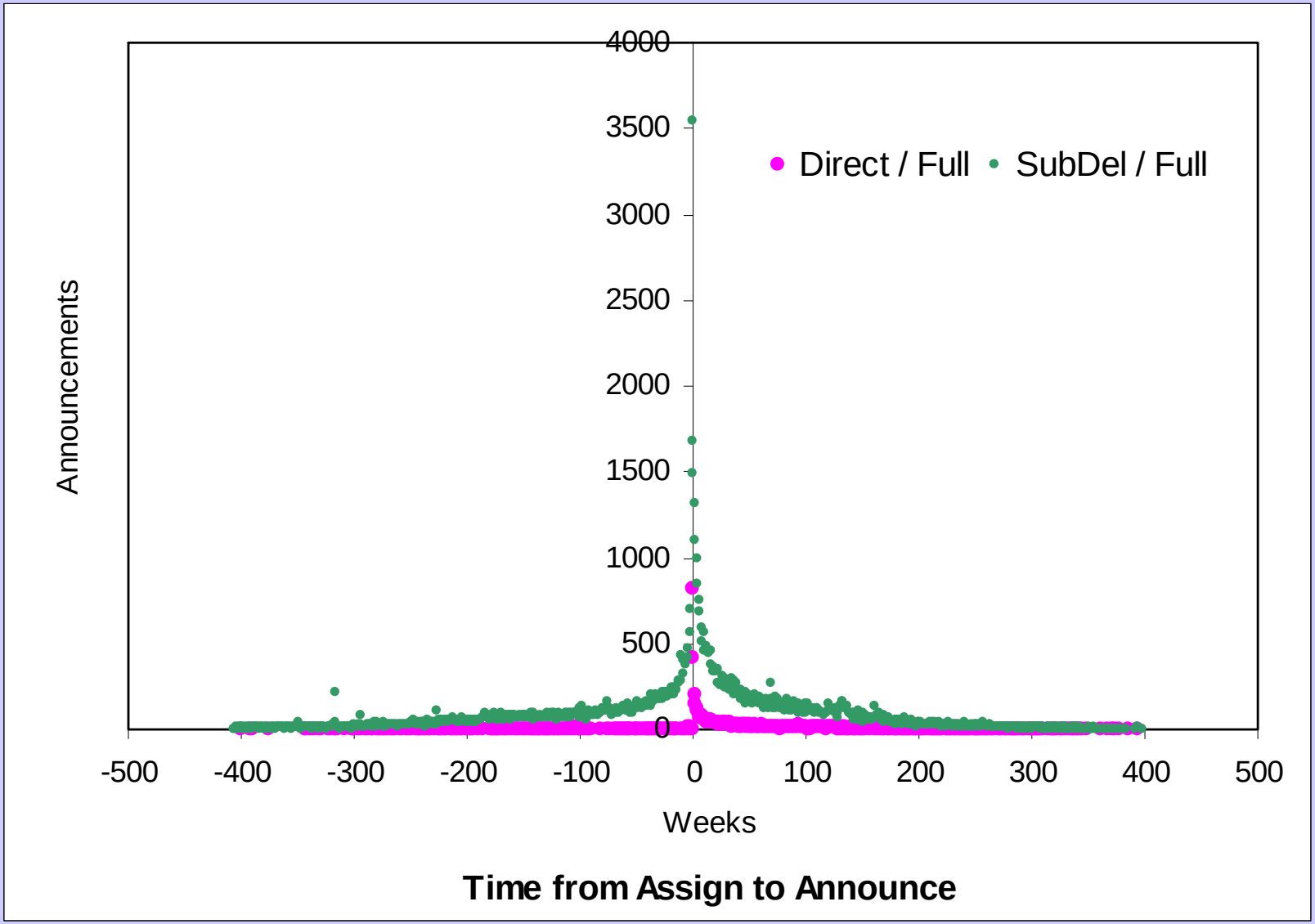
Announcing Full ARIN Assignment



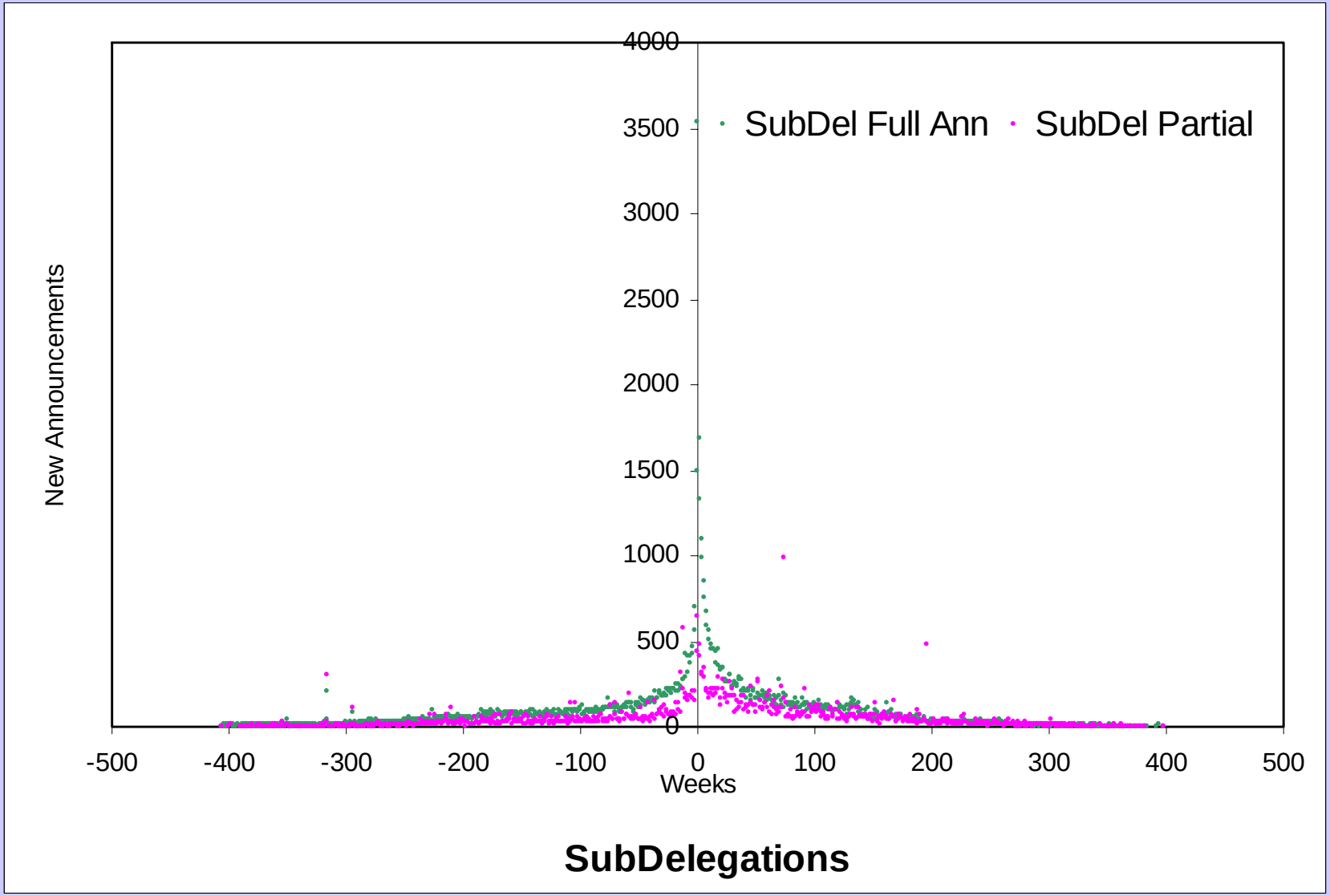
Full & Partial Announcements



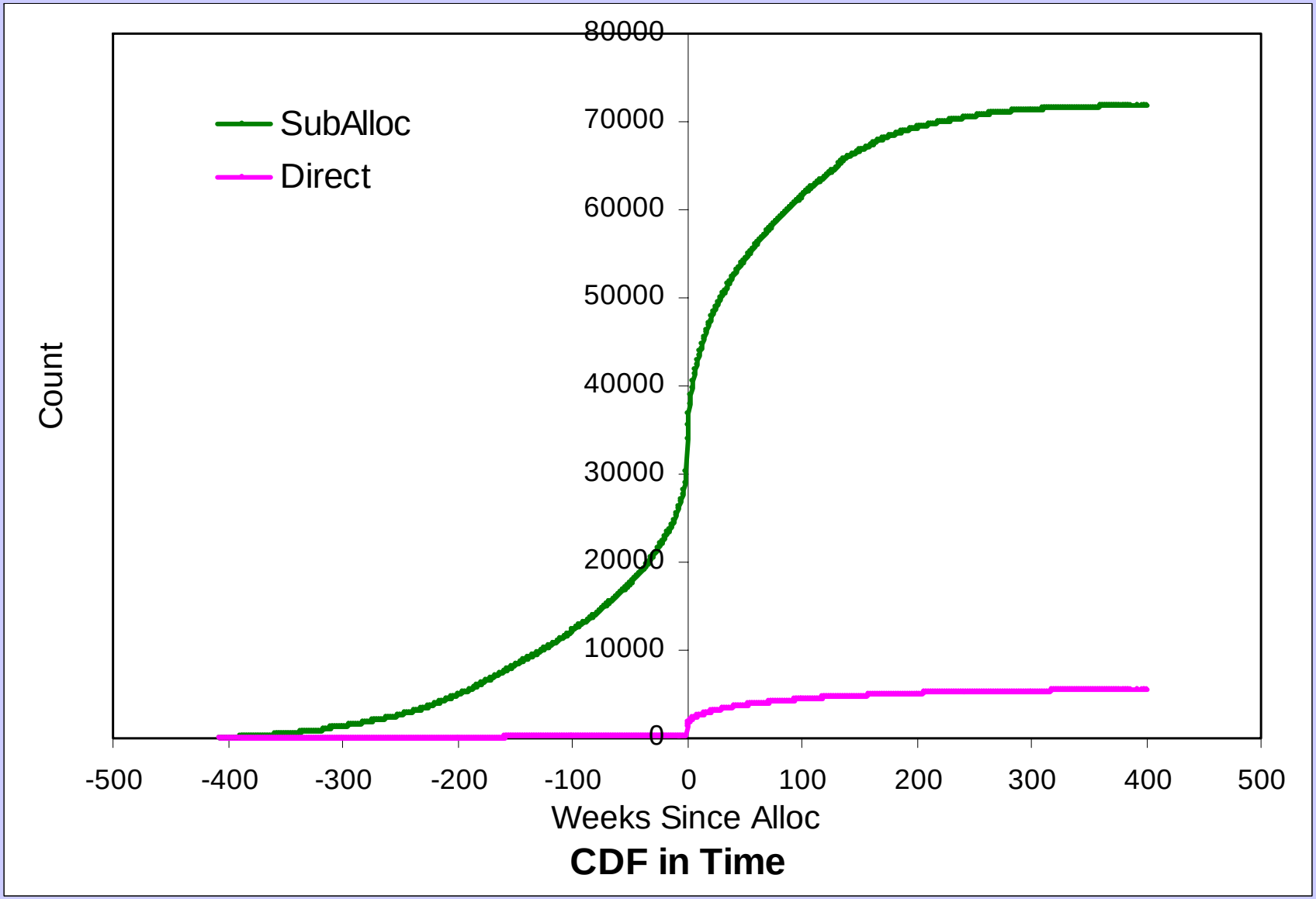
Direct vs Sub-Assignments



Sub-Delegations - Full and Partial



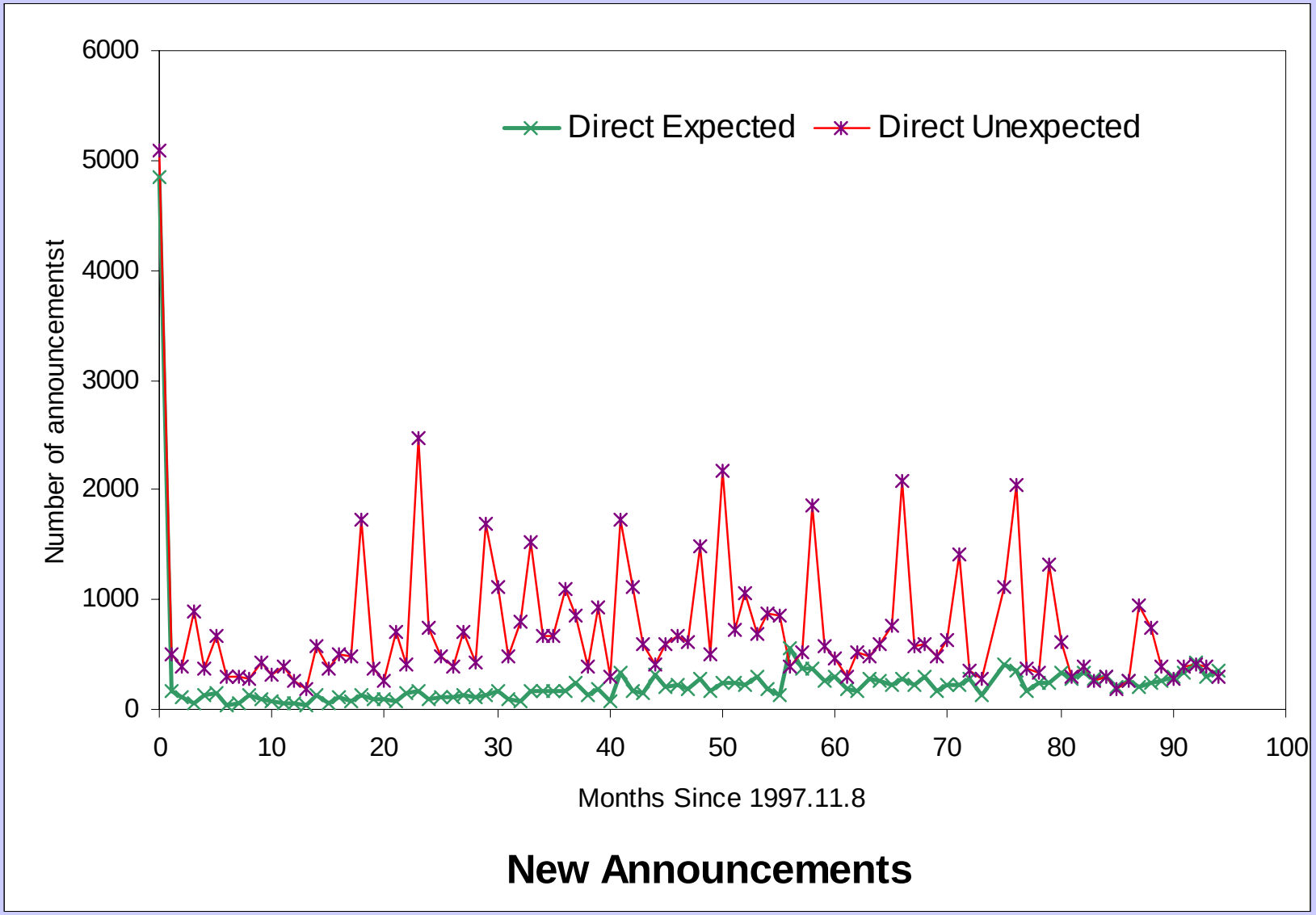
CDF in Time



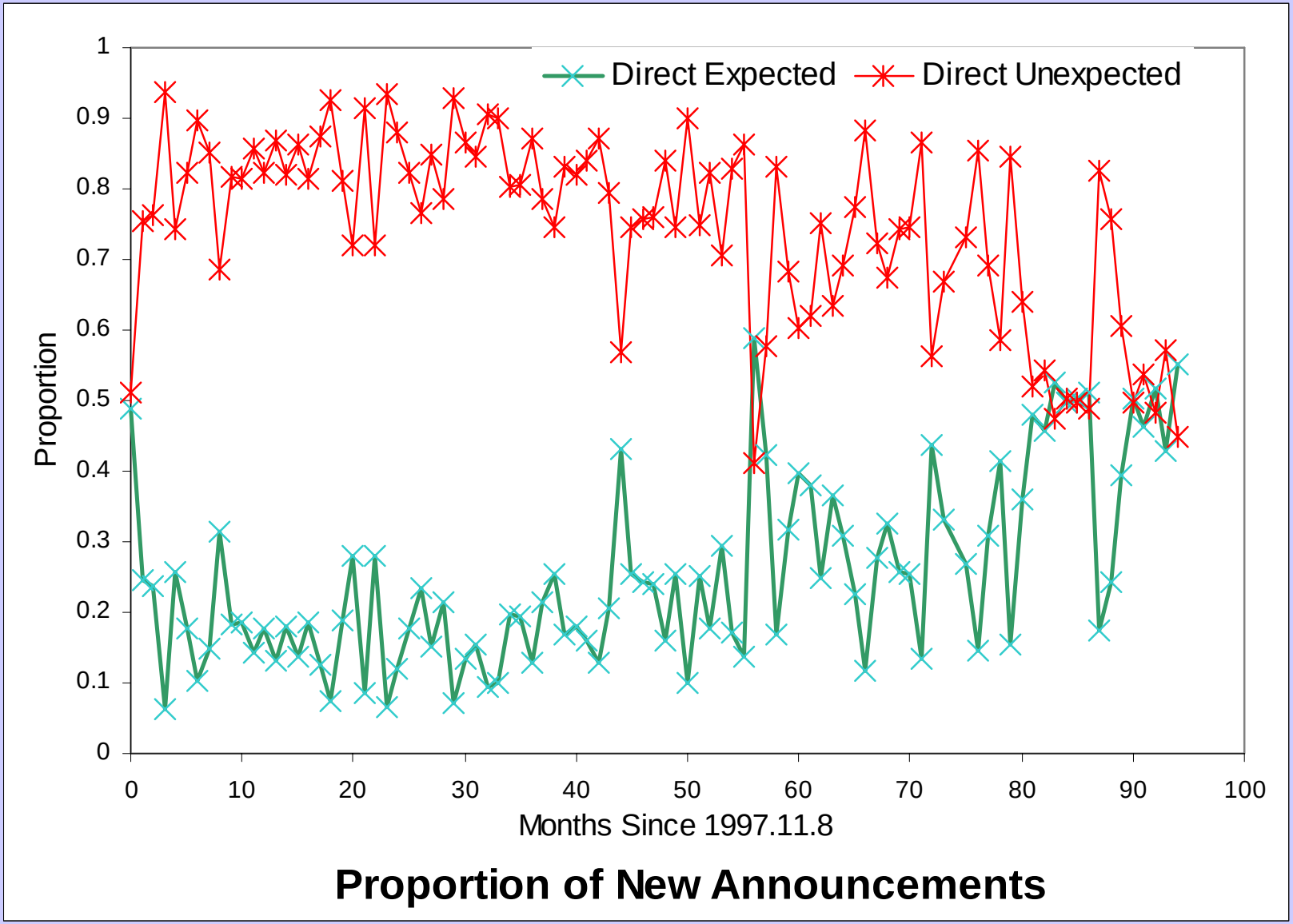
Database Hints to Origin AS

- Holders of resources are identified in ARIN's database by Org_Name and by Org_ID. Using first Org_ID then Org_Name for each network is matched to any ASs held by that organization.
- The matching attempts to identify as *probably legitimate* an announcement of a network by an AS where **both the network and the AS are held by the same organization in ARIN's database.**

ARIN Data vs BGP Origin AS

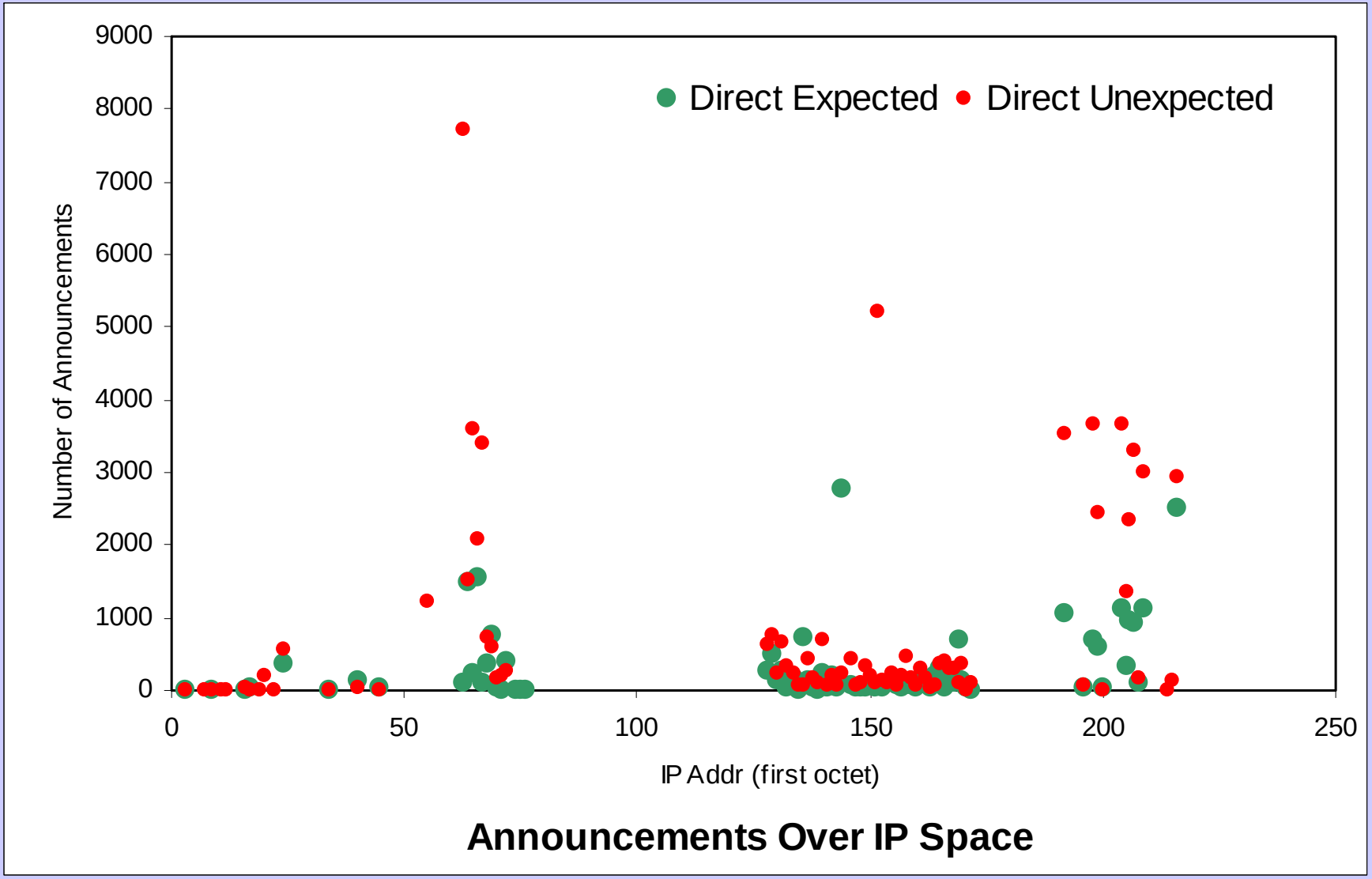


Things are Improving



Proportion of New Announcements

Any Correlation w/ IP Space



Thoughts

- Some LIRs tend to announce pretty quickly once they get an allocation
- Some don't register sub-allocs until they need more space from ARIN
- This studies when allocations were announced, not when announced prefixes were allocated or by whom
- More study needed!

Thanks To

- ARIN for data and support
- NSF via award ANI-0221435 (Oregon)
- The University of Oregon Route-Views (Lucy and Joel)
- Verio and Sprint (bandwidth)
- Juniper, Cisco, & Procket (routers)