



Building critical mass of peers 

Understanding the

Internet Exchange Point Playbook



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Two Frequently Asked Questions

- How does an IXP build critical mass?
- How do they attract that first player?
- Is it hopeless to compete against a well established IXP already well beyond critical mass?

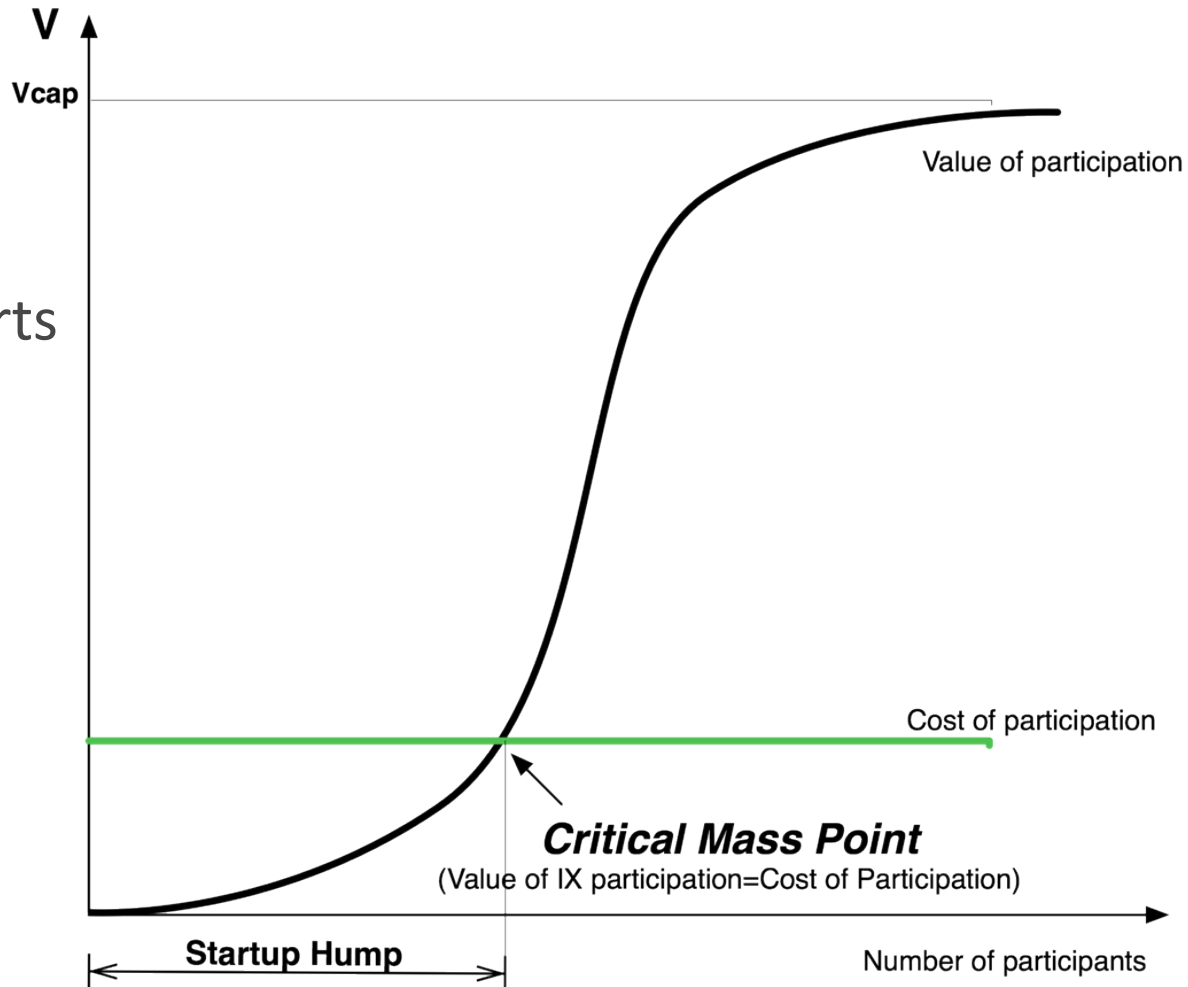
Definitions

- Definition: A **Successful IXP** is an IXP where the value derived from peering exceeds the cost of participation.
- Definition: **Network Externality** is an economists notion that the value of a product of service is proportional to the number of others using that product or service. (e.g. Fax Machines)

The “Startup Hump”

Value of the Internet Exchange Point

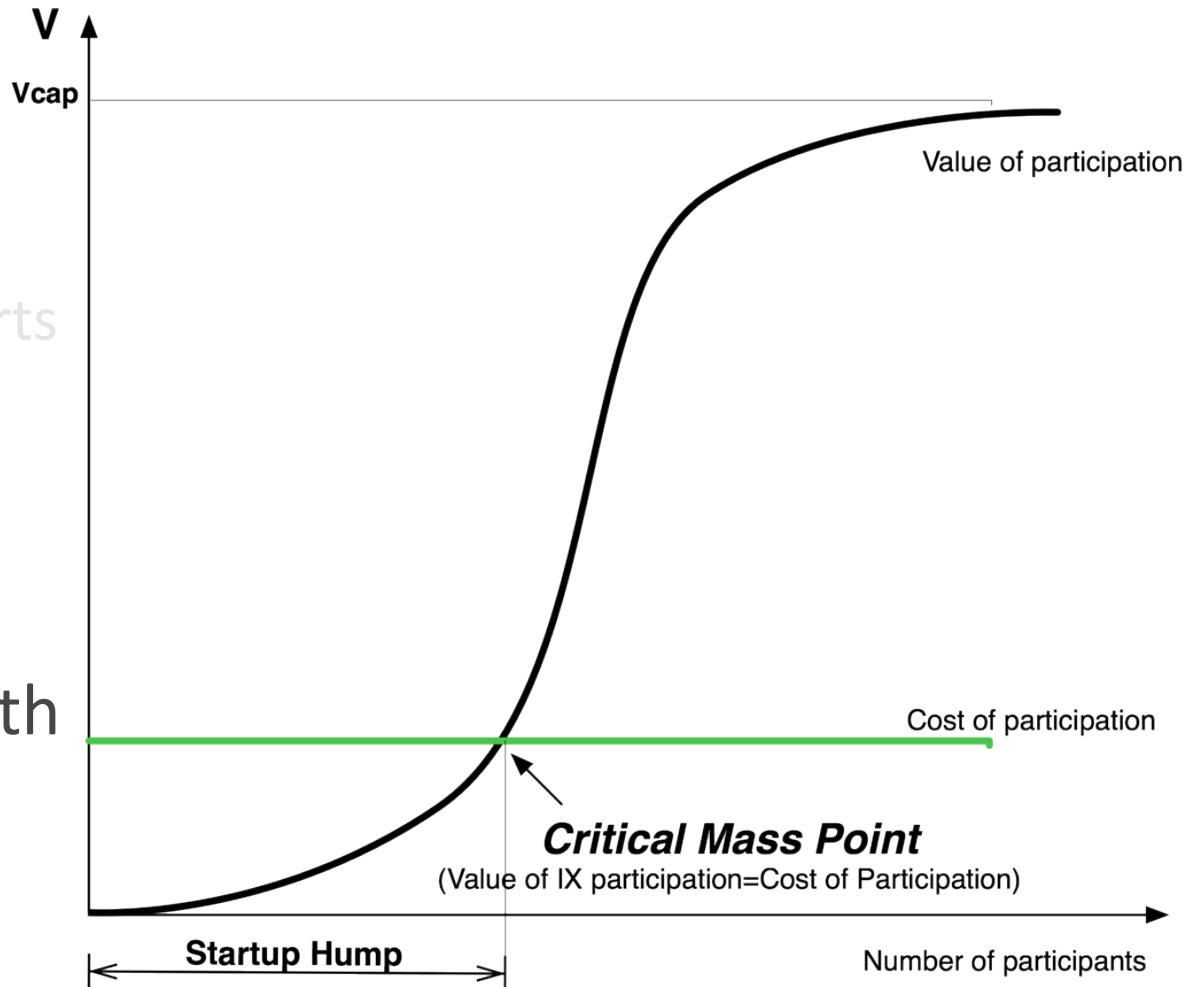
- Heavy lifting
- Value IXP < Cost
 - Blue Mountain Arts
 - Drew carrier in



At Critical Mass

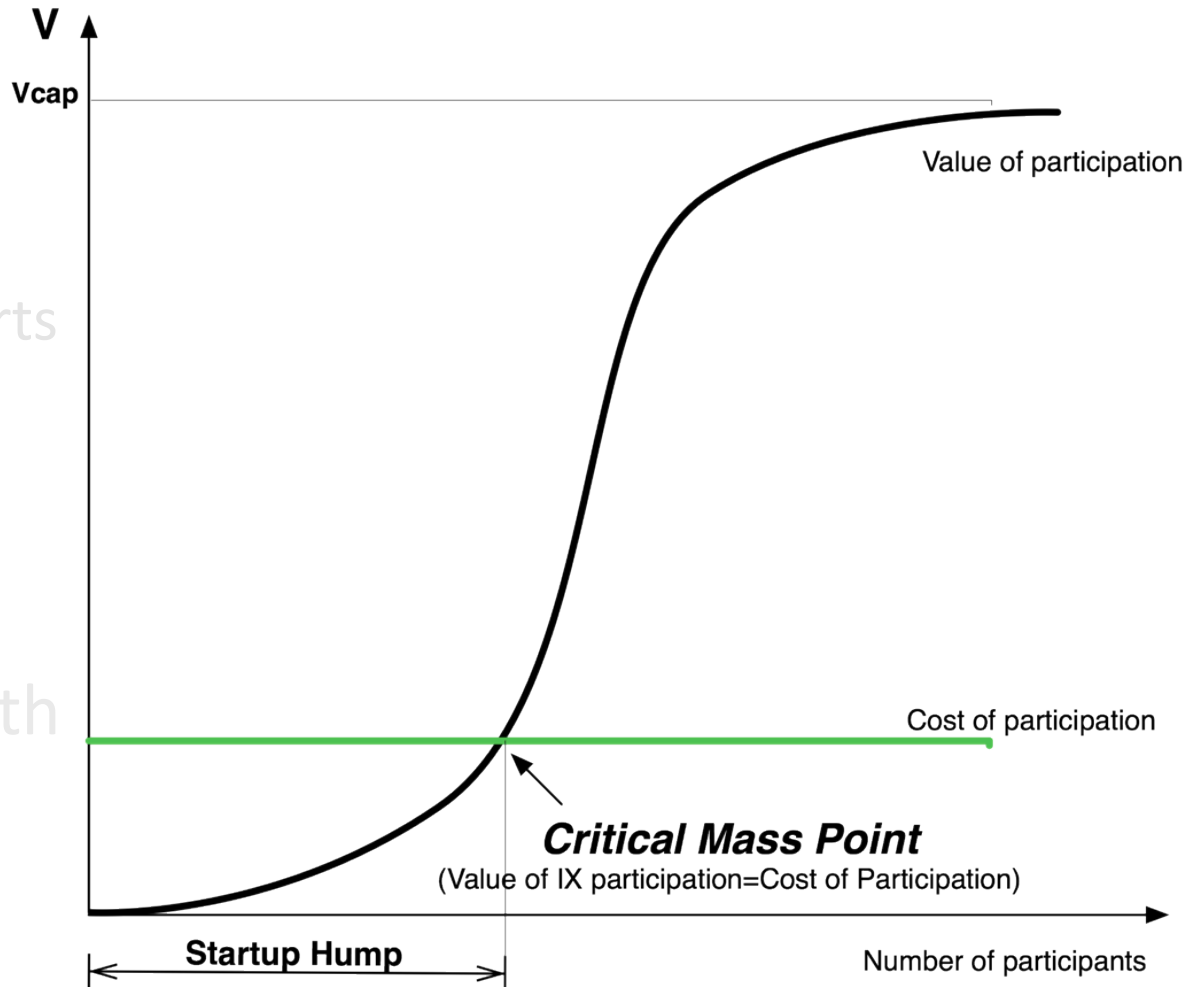
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- Provable Value Proposition
- Exponential growth
 - $n(n-1)$
- Colo revenue
 - $+ n(n-1)/2$ XCs !



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- **AT CAPACITY**



Simple IXP Value Calculation

- Assume an IXP switches 1 Tbps (1,000,000 Mbps).
- Assume it charges \$3500/month uniformly across its 350 participants.
- Assume the market price for transit is \$2/Mbps.

1) What is the value of this IXP to its participants?

2) What is the average value of this IXP to the individual participant?

3) Is this IXP past critical mass?

Value=mbpsExchanged*avgTransitCost-CostOfPeering

Value=1,000,000 Mbps * \$2/Mbps – 350 * \$3500/mo

Value=\$2,000,000 - \$1,225,000 = \$775,000/month

Per participant value=\$775,000 / 350 = \$2214/month

Graphic calculation of the Value of an IXP

Value of the Internet Exchange Point

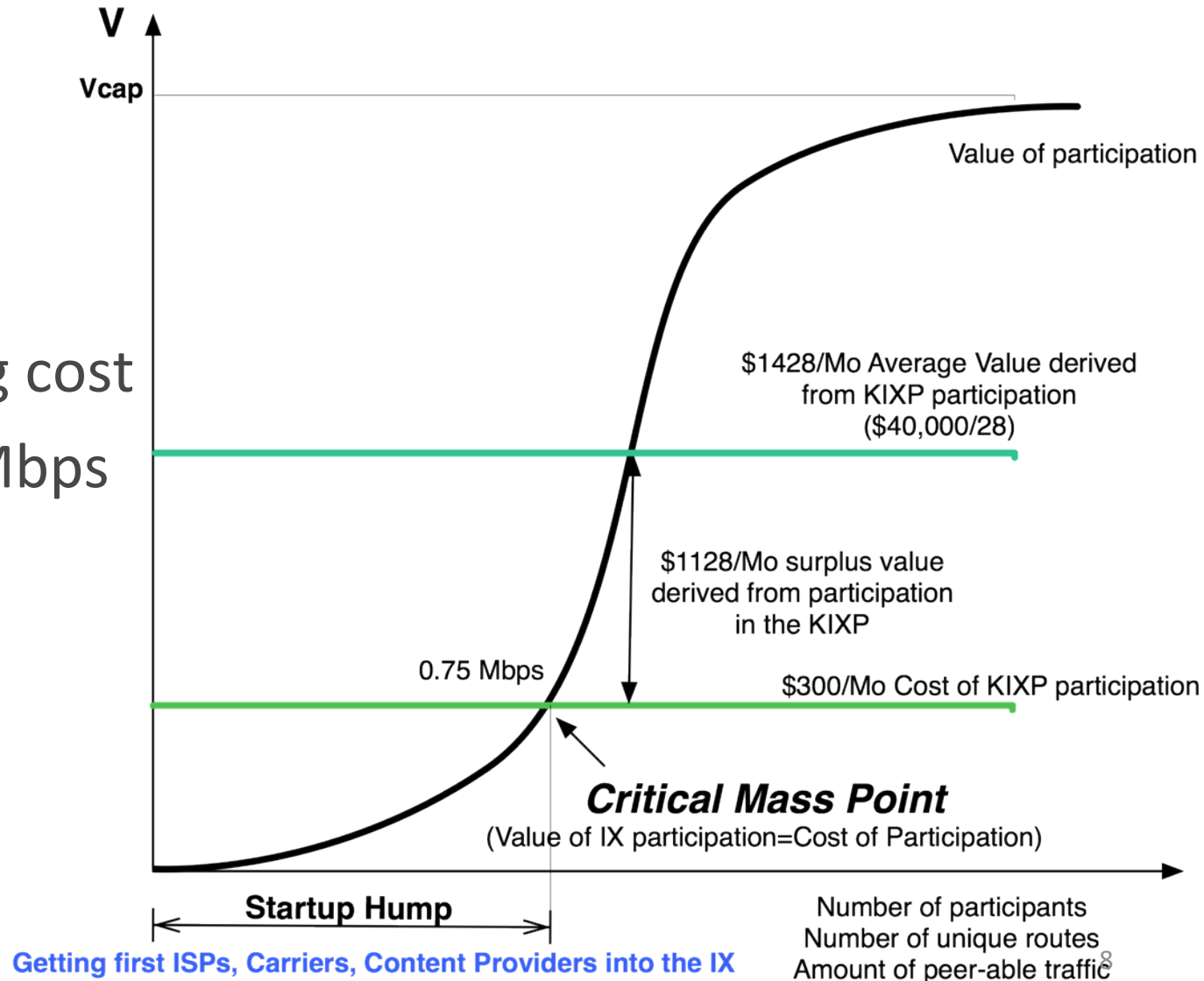
Kenya IXP (KIXP)

28 members

\$300/mo peering cost

Transit is \$400/Mbps

100Mbps peered



Belgium Neutral Internet Exchange (BNIX)

- 44 participants
- 30Gbps peered
- Transit 2 Euros/mbps
- Cost of peering is 1000 Euros/month
- What is the value of the BNIX?

$$30,000\text{Mbps} * 2 \text{ Euros/Mbps} - 44 * 1000 \text{ Euros/mo} = 22\text{K Euros/mo}$$

Short name	Name	City	Members	Throughput (Gbit/s) average	Per-Member Transit Saved @\$2/Mbps
DE-CIX	Deutscher Commercial Internet Exchange [1]	Frankfurt am Main	359	901	\$5,019
AMS-IX	Amsterdam Internet Exchange [2]	Amsterdam	408	820	\$4,020
LINX	London Internet Exchange [3]	London	387	574	\$2,966
MSK-IX	Moscow Internet Exchange [5]	Moscow	328	248	\$1,512
UA-IX	Ukrainian Internet Exchange Network [6]	Kiev	110	172	\$3,127
JPNAP	Japan Network Access Point [7]	Tokyo and Osaka	44	160	\$7,273
Netnod	Netnod Internet Exchange in Sweden [8]	Stockholm, Malmö, S	64	118	\$3,688

Criticisms of this model of IXP valuation

- Only counts public peered traffic
 - Ignores private peering and transit sales!
- Assumes customer homogeneity
 - Same traffic volume, same port speed, same prices
- Assumes peered traffic bypasses transit
 - Peering is between Tier 1 ISPs also
- Peering costs ignore cost of transport, equipment, staff, opex, etc.

The Financial Model for the Value of an IXP

- Value of the IXP = $f(p, r, v, m) - c$

p=number of participants at the IXP

The how many

r=number and uniqueness of routes available at IXP

The who there

v=volume of traffic peered

The How Much?

m=Match of service to market and stickiness

The why there?

c=Cost of participation

All IXP tactics I describe manipulate one or more of these variables

Tactic 1. Bluff the Size of the Population

- Bluff carriers
 - PacBell vs. WorldCom : Losing market share!
- Bluff two potential peers
 - “B is pretty close to building in”
 - “Representative Members...”
 - “We are in talks right now with...”
 - Slips to “X is there, Y is there soon, you will be the last one there.”

Tactic 2. Build a Network Umbilical for later IXP migration

\$2000/rack

Vs

\$500/rack

\$15K/mo for fiber run

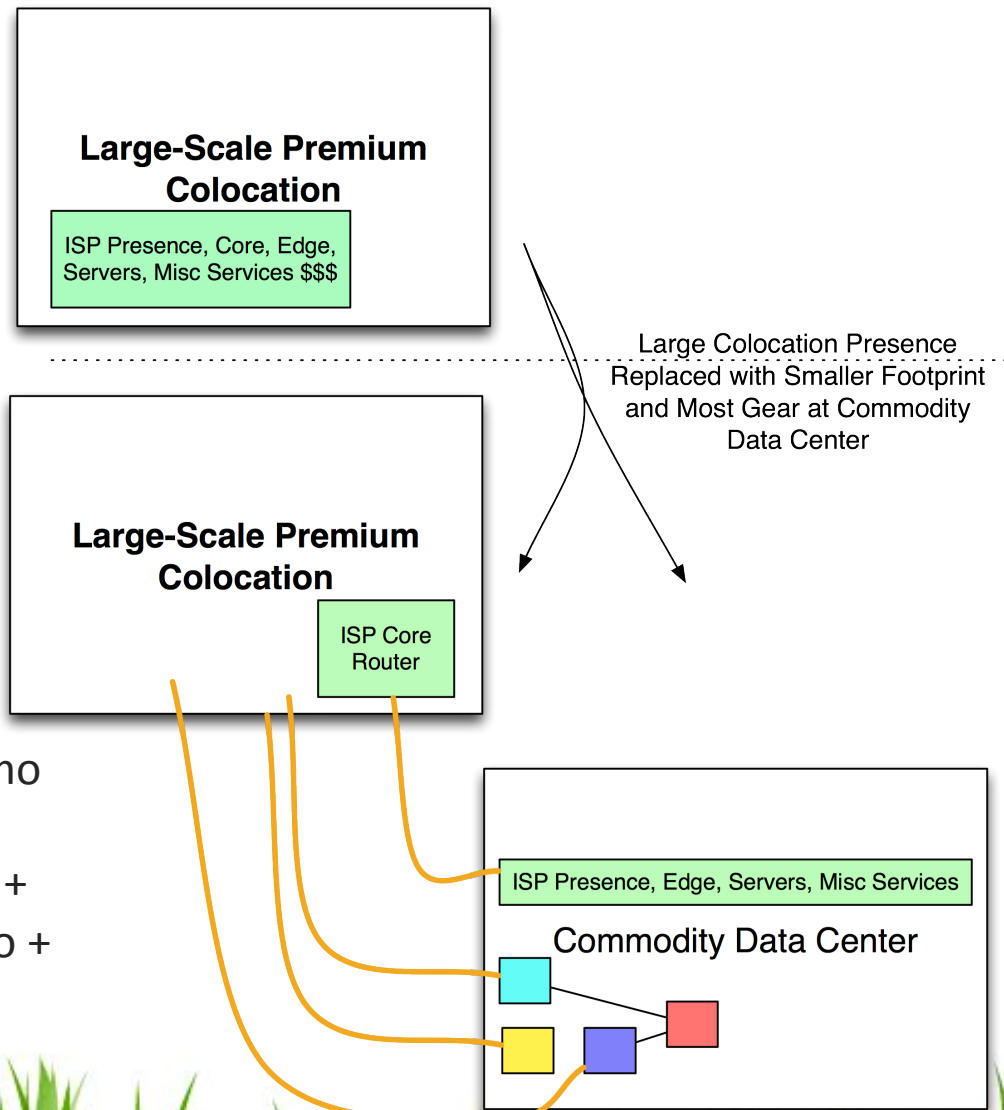
100 racks*\$2K=\$200K/mo

Vs.

10 racks*\$2K=\$20K/mo +

90 racks*\$500=\$45K/mo +

20K/mo for fiber.



Tactic 3. Group buy-in

Examples:

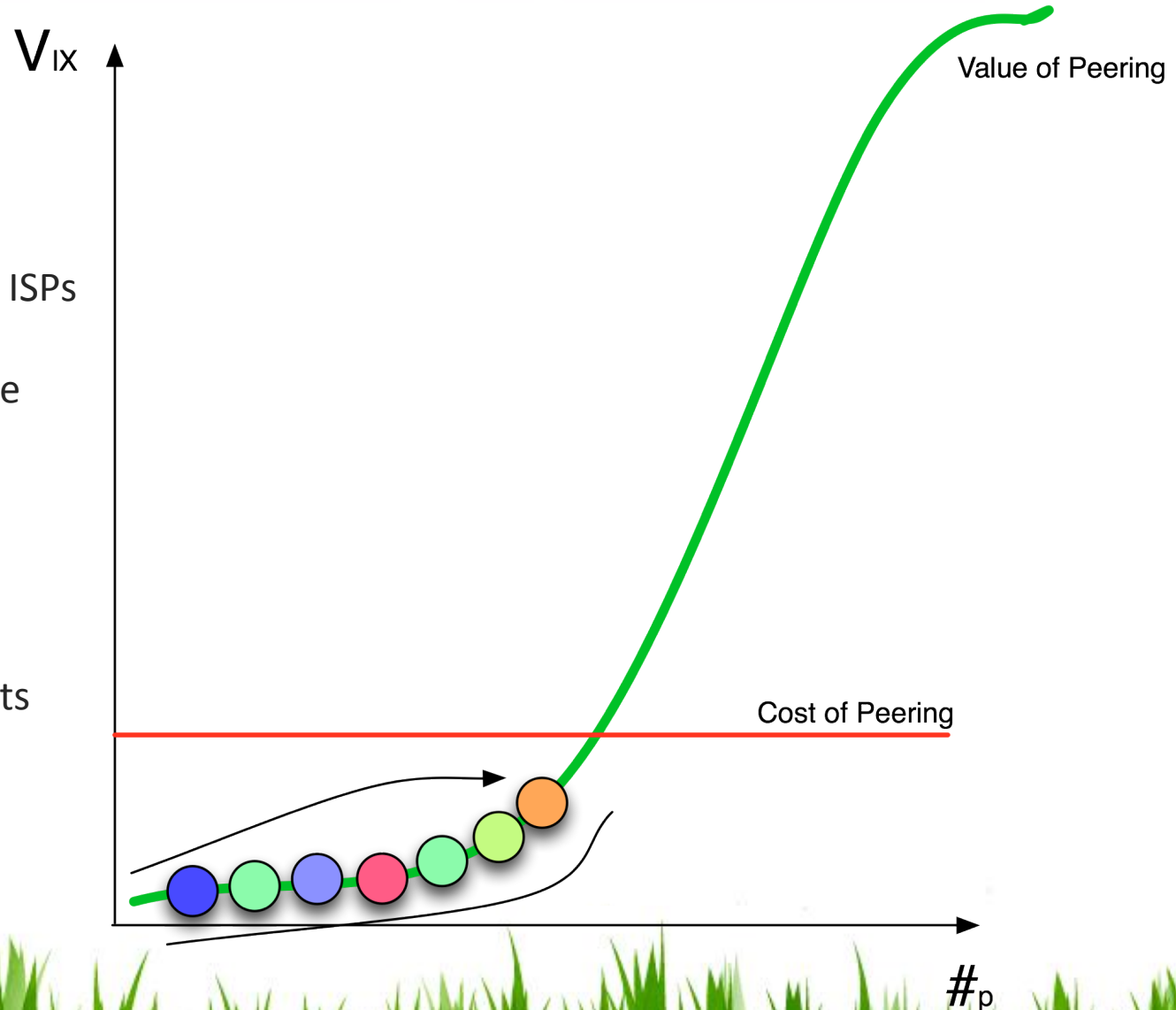
European IXPs founded by collection of European ISPs

Cable companies converge

Tier 1 ISPs converge

Ownership, stewardship

Participants are evangelists for their favorite IXPs

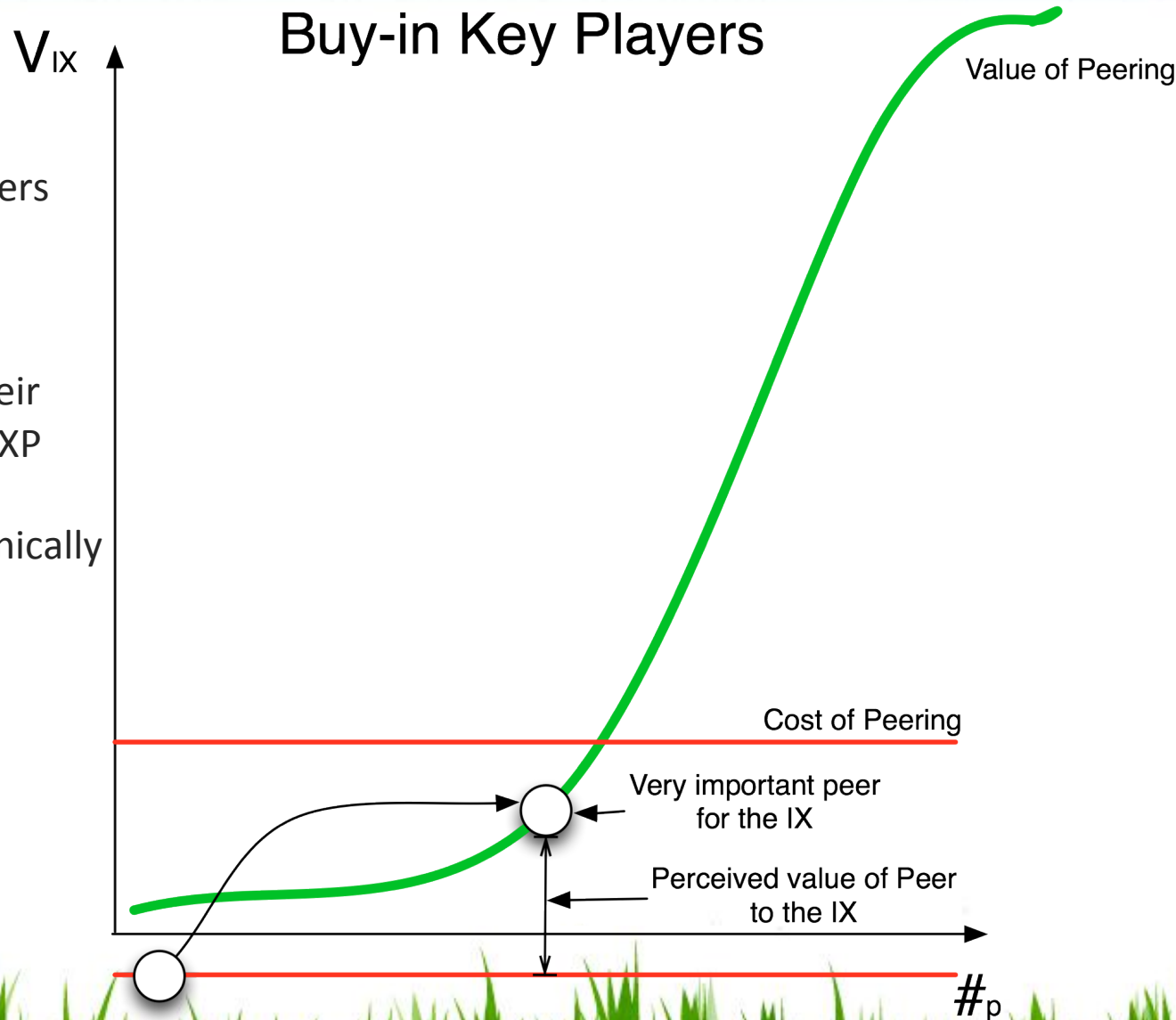


Tactic 4. Buy in Key Players

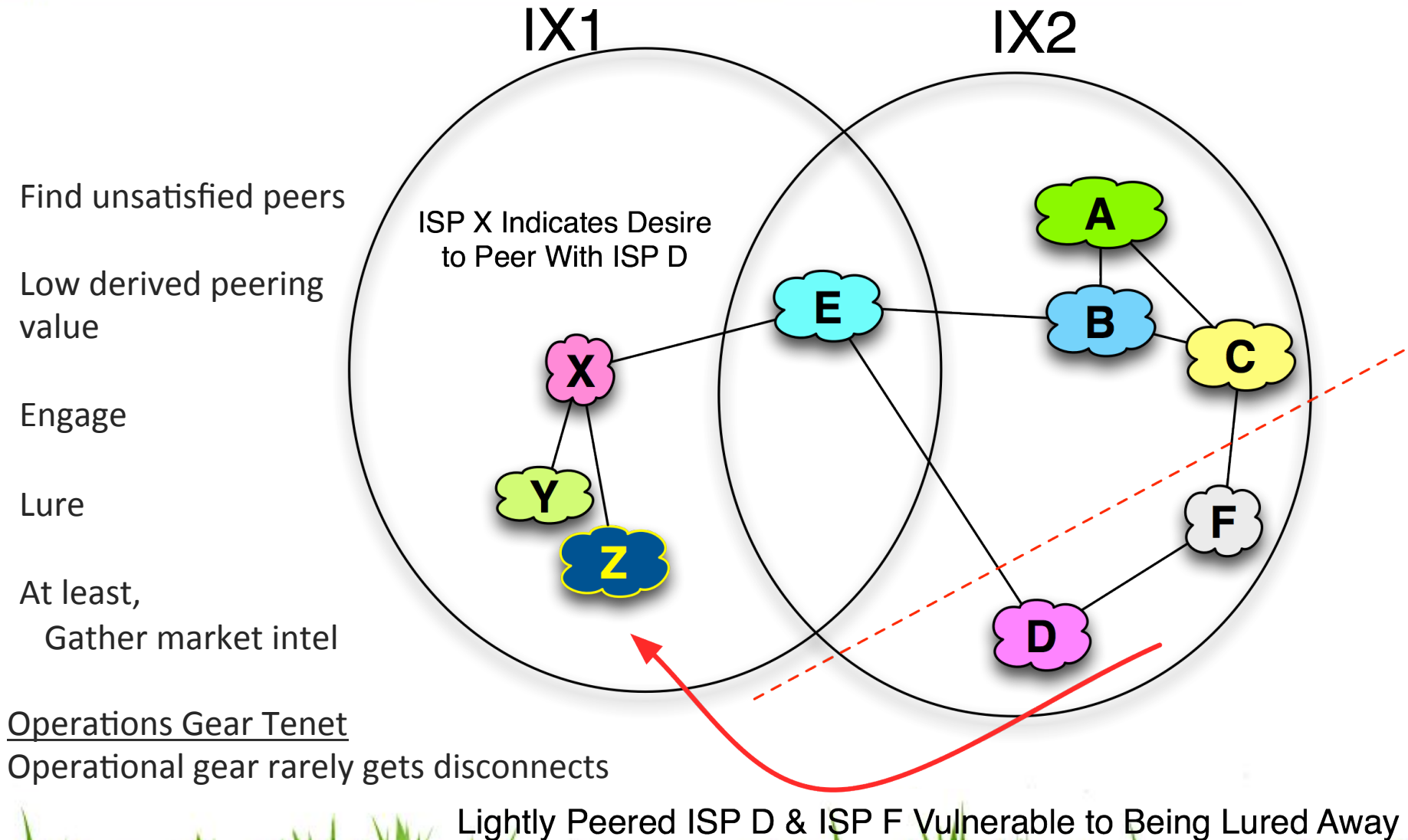
Pre-Buy circuits
On behalf of future customers

Stock options:
Participate in the upside,
Recognition of the value their
participation brings to the IXP

As opposed to grow it organically
by natural lures of active
participants



Tactic 5. Divide and Conquer



Tactic 6. Beachhead Verticals and Niche Markets

Weaknesses in other IXP

Examples

Weak SLA

Constrained private peering

Insufficient Terms & Conditions

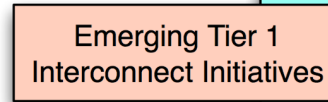
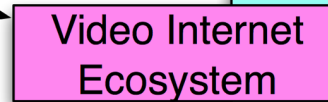
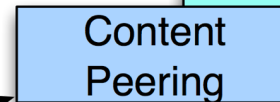
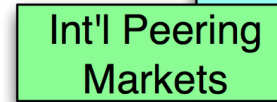
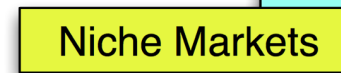
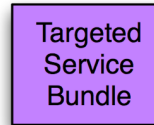
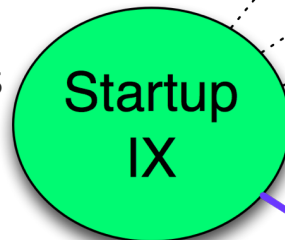
Content Providers not allowed

Insufficient operations support

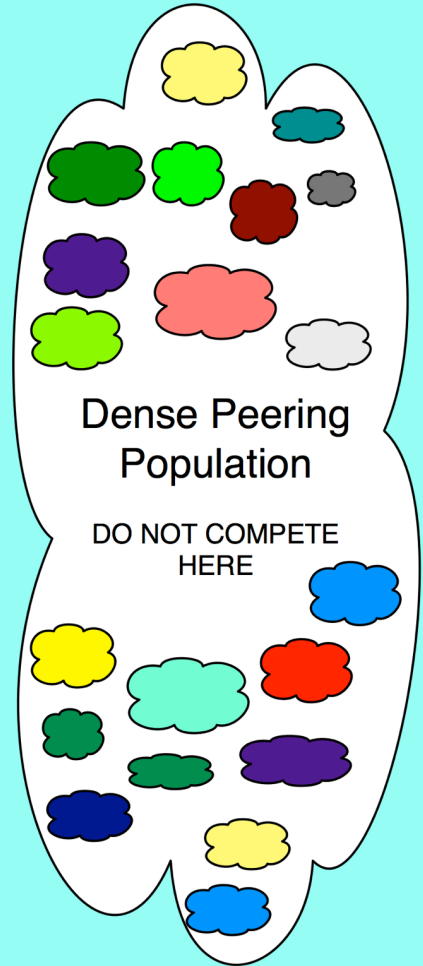
No transit sales allowed

Underserved peering market

Lead Industry in
an Emerging
Sub-Markets



Dominant IXP



Tactic 7. Extend the Dominant IXP

- Resell dominant IXP services
- Rarely works – who benefits more?
 - Competitors
- Different from European model IXP
 - Spread across colo
 - Competing switches
- If allowed, build name, reputation
 - Lure customers to peer on both fabrics
- Telco hotels – challenges running between tenants

Tactic 8. Prevent Rogue IXPs

- AMS-IX contractually prevents colo from operating their own shared switch fabric
- Rogue IXP within U.S. Model colo
 - Bypass “overpriced” colo switch
- This fails because
 - Colo could kill cross connects to the rogue switch
 - So rogue IXP is marketing in stealth mode
 - Ad hoc management, volunteer staff

Tactic 9. Swim with the Fishes

- The value of the IXP is largely out of the control of the IXP operator : $v=f(p,r,v,m)-c$
 - Data not easily visible
- Go to every ops conference possible for data
 - ISP peering locations (current, pending, planned)
 - Peering relationships (current, pending, planned)
 - Desirable target peers
 - Transit and transport prices, provide value to prospects
 - What people say about competitors and you
 - Contract terms and duration

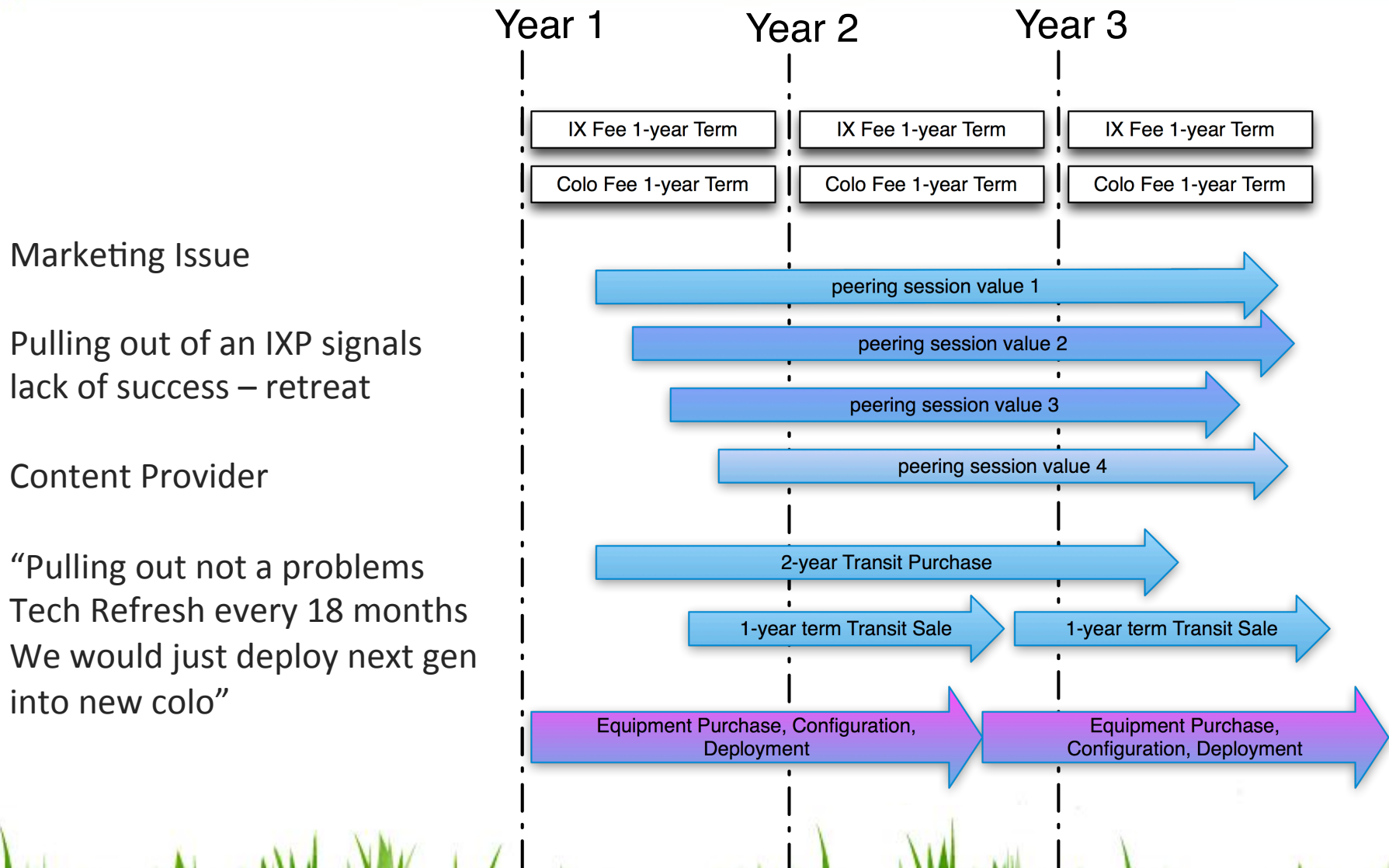
Tactic 10. Bundling

- Multiple IXPs
 - Desirable location + less populated one for free
- Redundant switching fabrics
- Free port with real estate

Tactic 11. Build and Maintain Population Stickiness

- Definition: **IXP stickiness** refers to the forces keeping a peer at the IXP
- Value-based Stickiness
 - Value > Cost
- Time-Skew-based stickiness
 - Terms of contracts for colo, transit purchases and sales, transport purchases, peering port purchases, etc. not aligned

Time-Skew-Based Stickiness



Marketing Issue

Pulling out of an IXP signals lack of success – retreat

Content Provider

“Pulling out not a problems
Tech Refresh every 18 months
We would just deploy next gen
into new colo”

There is No Convenient Time to Move Out!

Interdependence-based stickiness

- Personal peering introductions
- Conference call peering introductions
- E-mail peering introductions
- Informal socialization

Tactic 12. Strengthen Peering Population

- European-based IXP has built in defense
 - Rival IXP triggers founding ISPs response
 - “Their” IXP
- Work very close with ISPs, Content Providers
- Systematically maximize interconnection

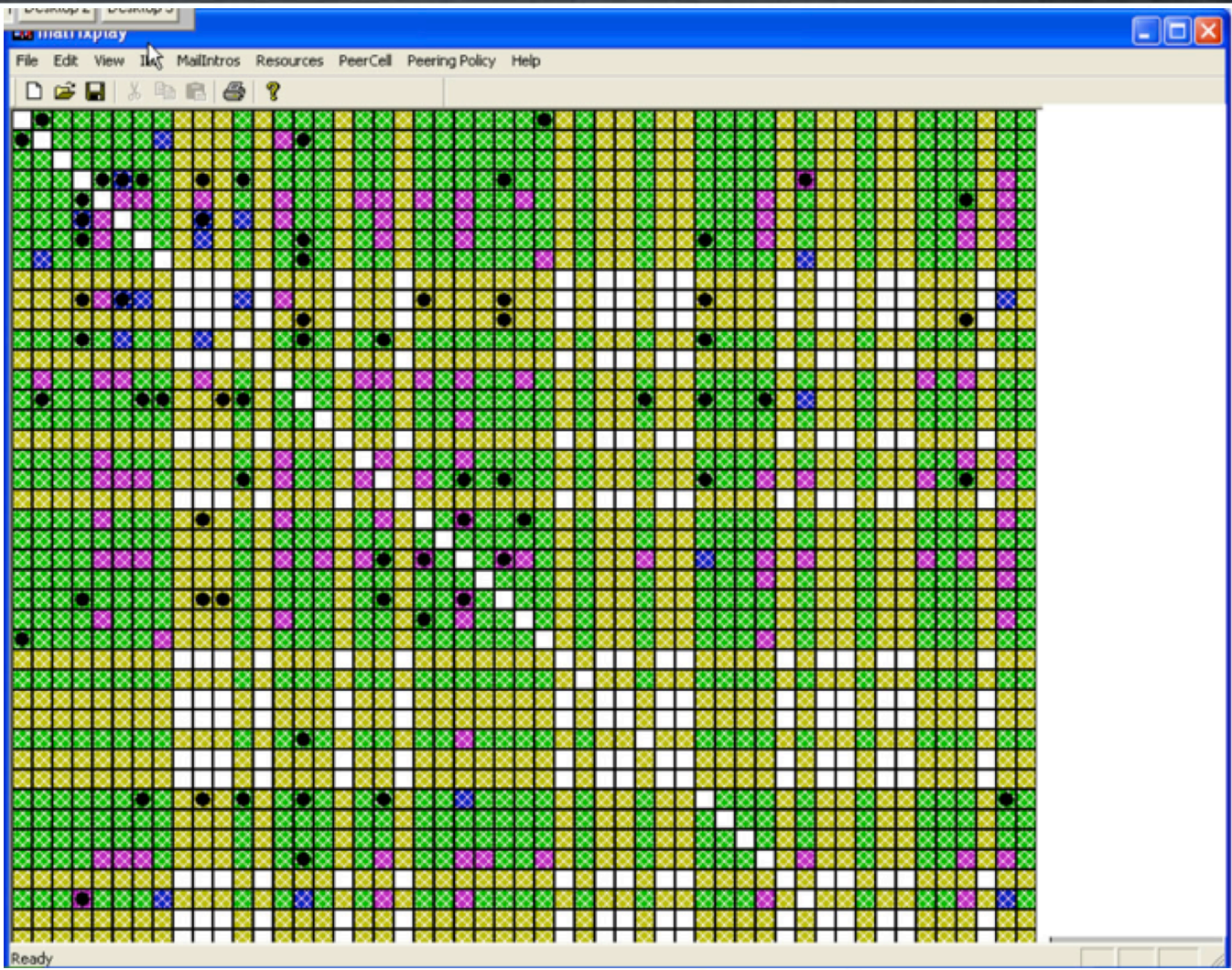
Peering Matrix

	Open Peers	Selective Peers	Restrictive Peers
Open Peers	Full Mesh Peering	Maybe	
Selective Peers	Maybe	Maybe	Unlikely
Restrictive Peers		Unlikely	

The matrix is divided into three horizontal sections by thick black lines. The top section contains the 'Open Peers' row. The middle section contains the 'Selective Peers' row. The bottom section contains the 'Restrictive Peers' row. Green arrows indicate transitions: a horizontal arrow from 'Full Mesh Peering' to 'Maybe', a vertical arrow from 'Full Mesh Peering' to 'Maybe', a horizontal arrow from 'Maybe' to 'Unlikely', and a vertical arrow from 'Maybe' to 'Unlikely'.

Track peering
Track introductions
Track success

Green: both are open
Purple/Blue: they peer
Black: introduction made
White: don't know



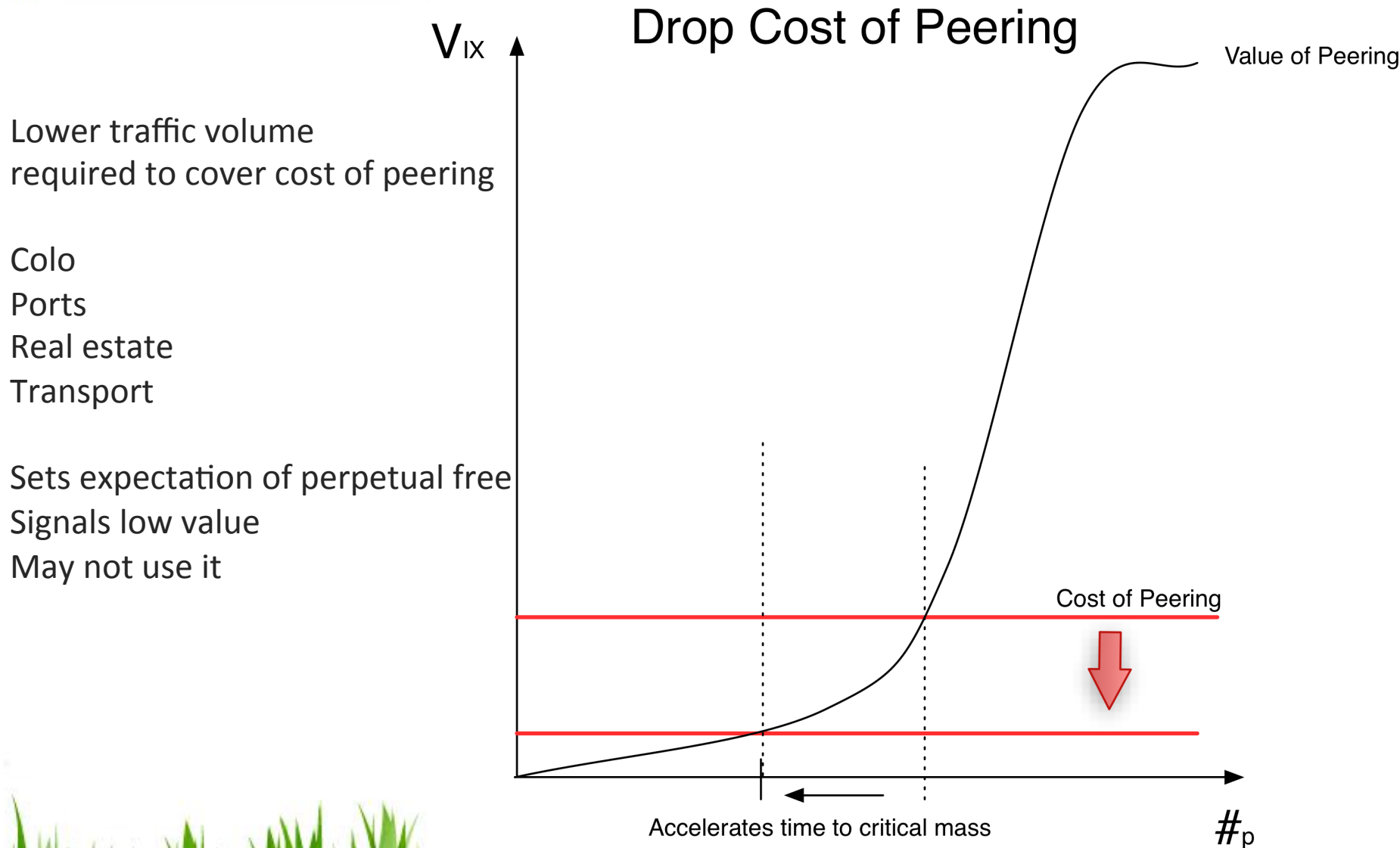
Tactic 13. Demonstrate Leadership

1. Publish white papers
2. Promote peering
3. Develop peering discussion lists
4. Lead peerign Forums
5. Get key staff onto Program Committees
6. Speak at Conferences and Trade Shows
7. Continually build and mak=intain marketing information base for peering
8. Communicate key milestones (custs, volume)

Tactic 14. Purchase Legacy Data Center During Downturn

- Pennies on the dollar
- Ray the Hoster story

Tactic 15. Drop Peering Cost



Price on Value

Overcome uncertainty

First 10 75% off
Next 10 50% off
Next 10 25% off
Rest at retail price

or
Adjust prices over the years

