IX Service Level Research Project

Taiwan Network Information Center

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1. Background

- The project was sponsored by the DGT (Directorate General of Telecommunications, Ministry of Transportation and Communications) in June 2004.

- The project is lead by the Chairman of TWNIC (Taiwan Network Information Center) and the TWIA (Taiwan Internet Association), Shian-Shyong Tseng and C. J.Chen, respectively.

Functions and role of IX

- Environmental Aspects
  - ✓ exchange center with peering environment between ISPs for the exchange of mass amount of digital data (e.g. e-commerce, multimedia data)
  - ✓ Through the platform provided by IX, ISPs can increase the number of peering parties without changing the connection structure

- Cost Aspects
  - ✓ Effectively decreasing the line construction cost between ISPs; Enhancing the overall Internet efficiency via the high speed transmission service provided by ISPs
  - ✓ Through the RA (Routing Arbitrator) and related service by IX, the manpower cost of ISP router and Internet management can be decreased

2. Current Status

- ➢ Fieldwork
  - ❖ Having visited 4 domestic IXs and other international IXs based in Japan, Korea and South East Asia; Compiling and analyzing the observed data according to the *"Operational Guidelines for IX Centers"* revised and passed by the 12th meeting of IP Address & Protocol Committee on 21st Nov, 2001.
    - ▪ The *Operational Guidelines* indicate the objectives, definitions, and regulations of infrastructure, service, private-owned Internet access, peering guideline, and operation supervision, etc.
- ➢ Questionnaire
  - ❖ Targeting on domestic ISPs to research into IX's positioning, service scope, peering policy, and the peering incentives among ISPs

Fieldwork on Domestic IXs: TWIX, TWNAP, TPIX, EBIX

|	
Positioning	All for-profit organizations
Peering Policy	All providing Bilateral Peering Agreement (BLPA); Two of them providing Multilateral Peering Agreement (MLPA)
Number of Peering Unit	All have more than 15 ISPs
Service Scope	Looking Glass、Co-location、Cross Link
Private-Owned Line Access Guidelines	Three of the four IXs provide options to choose other parties fixed-line
Data Exchange Guidelines	All providing layer 2 service
Operation Supervision	No mechanism or institutions to supervise the operation of IXs

Summary of IX Data Exchange Volume

TWIX
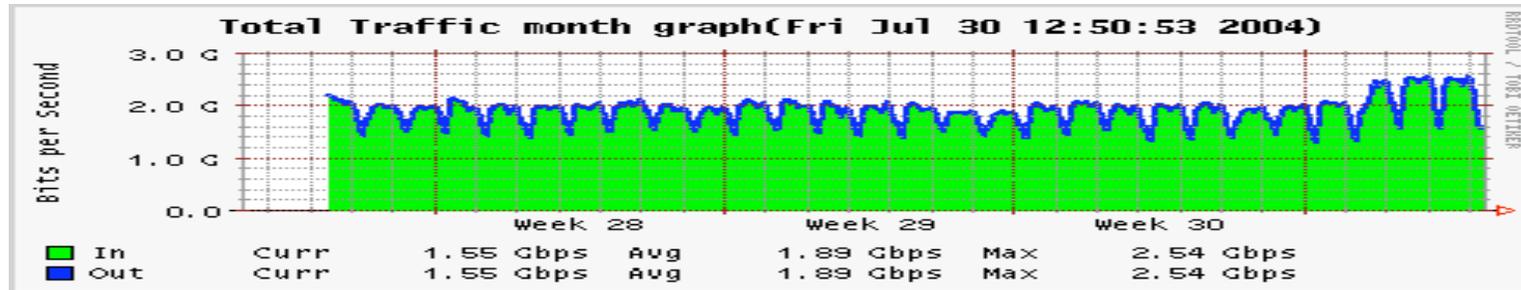
EBIX
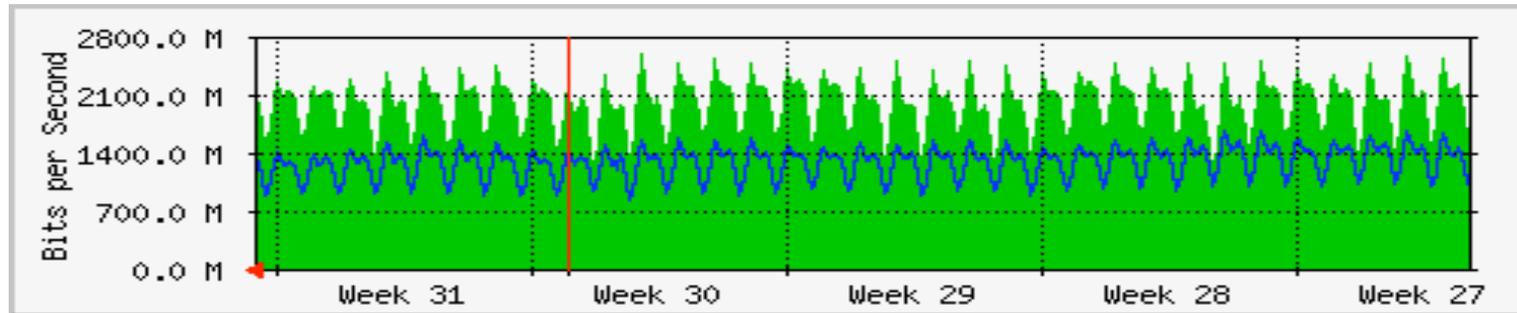
TWNAP
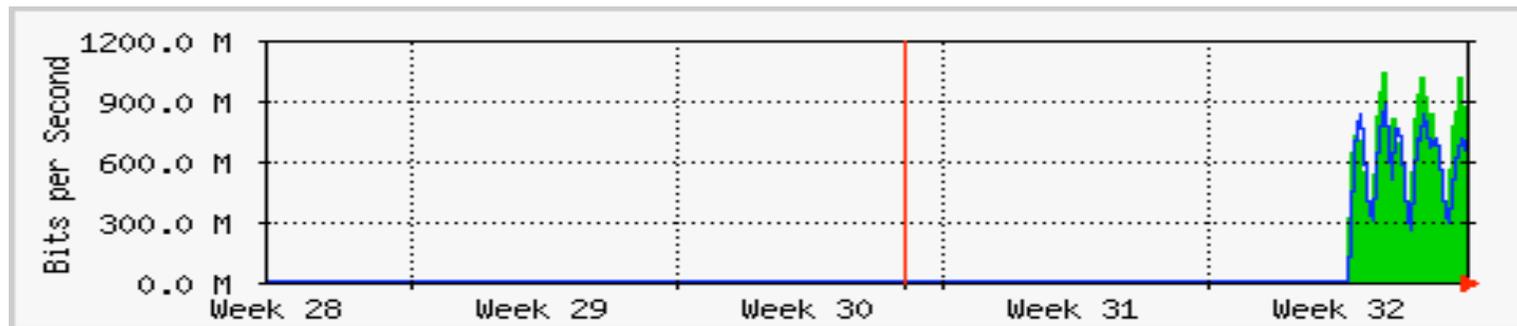
Current status of International IXs - Japan

Positioning	Can be generally categorized into 3 groups: independently established by ISP, co-funded by ISPs (e.g. JPIX, JPNAP), established by academic institution (e.g. NSPIXP/Dix-ie)
Peering Policy	All providing MLPA & BLPA
Number of Peering Unit	All have more than 15 ISPs/ICPs
Service Scope	Co-location service, Traffic quality monitoring, etc.
Private-Owned Internet Access Guidelines	Options to choose needed any parties fixed-line
Data Exchange Guidelines	Some providing layer 2 service; Other small to medium sized IXs providing layer 3 service as their main service
Operation Supervision	MPHPT (Ministry of Public Management,Home Affairs,Posts and Telecommunication) providing minimum regulation and appealing channel

Current Status of International IX - Korea

Positioning	Can be generally categorized into 3 groups: independently established by ISP (e.g. KTIX), co-funded by ISPs (e.g. KINX), established by governmental bureaus (e.g. KIX)
Peering Policy	All providing MLPA & BLPA
Number of Peering Unit	All have more than 15 ISP/ICP units
Service Scope	Co-location, Traffic Quality Monitoring, etc
Private-Owned Internet Access Guidelines	Options to choose preferred any parties fixed-line
Data Exchange Guidelines	Only KINX providing Layer 2 service
Operation Supervision	N/A

Current Status of International IXs – South East Asia

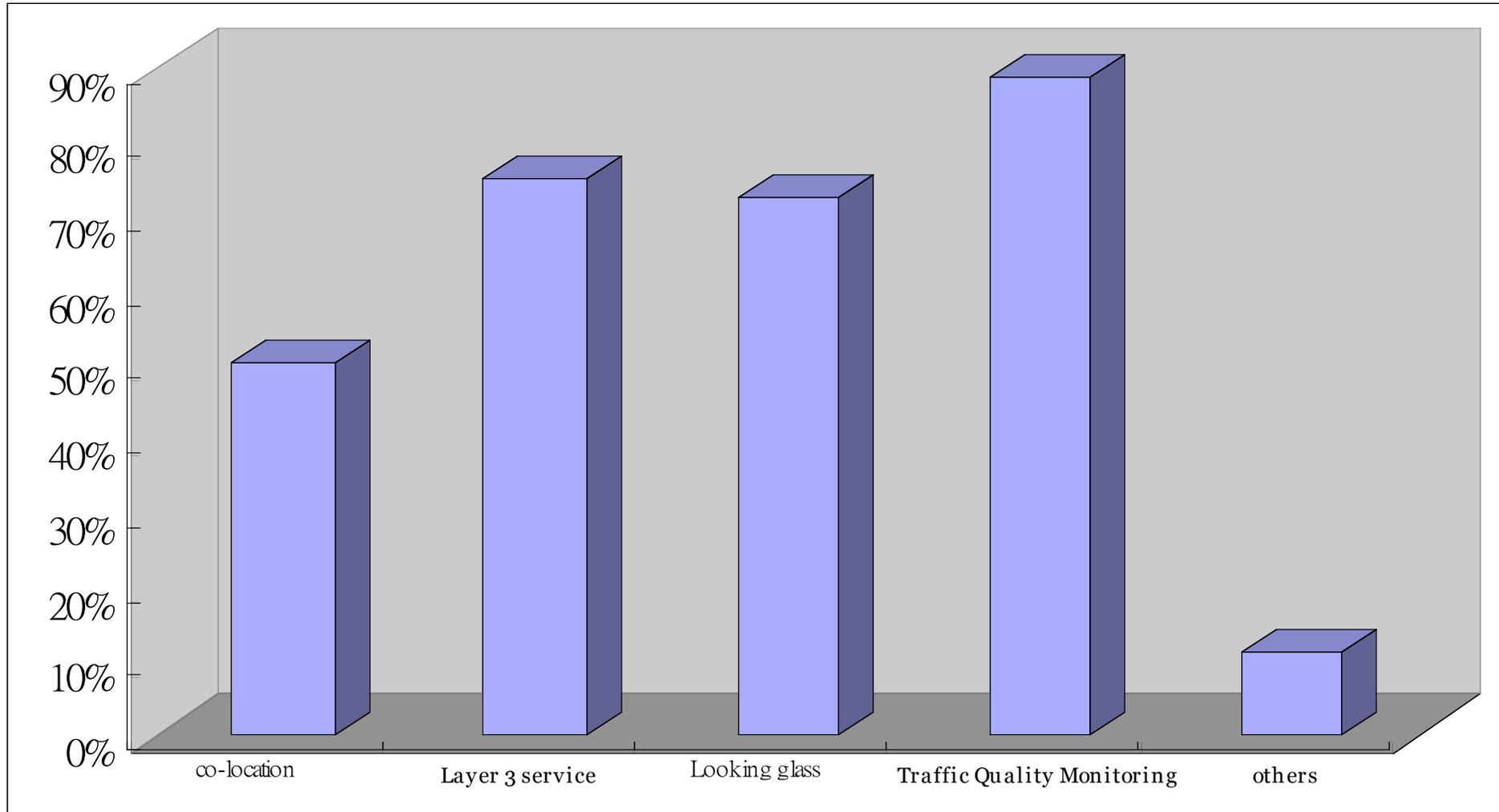|	
Positioning	Can be generalized in 3 categories: Established by ISP independently (e.g. Singtel), Established by academic or governmental organizations (e.g.SOX, HKIX, MIX)
Peering Policy	All provide MLPA & BLPA, HKIX even imposes compulsive MLPA, MIX is compulsion to make peer between Jaring and TMNet by government
Number of Peering Units	All have more than 10 ISPs/ICPs
Service Scope	Co-location, Traffic Quality Monitoring, etc.
Private-Owned Internet Access Guidelines	Options to choose preferred any parties fixed-line
Data Exchange Guidelines	Mainly providing Layer 2 service
Operation Supervision	N/A

Questionnaire

- **Reclamation Rate**
  - **about 60%**

- **Target**
  - **Units appeared in the exhibit of *Bandwidth Chart for Peering Units***
    - **IXs (4)**
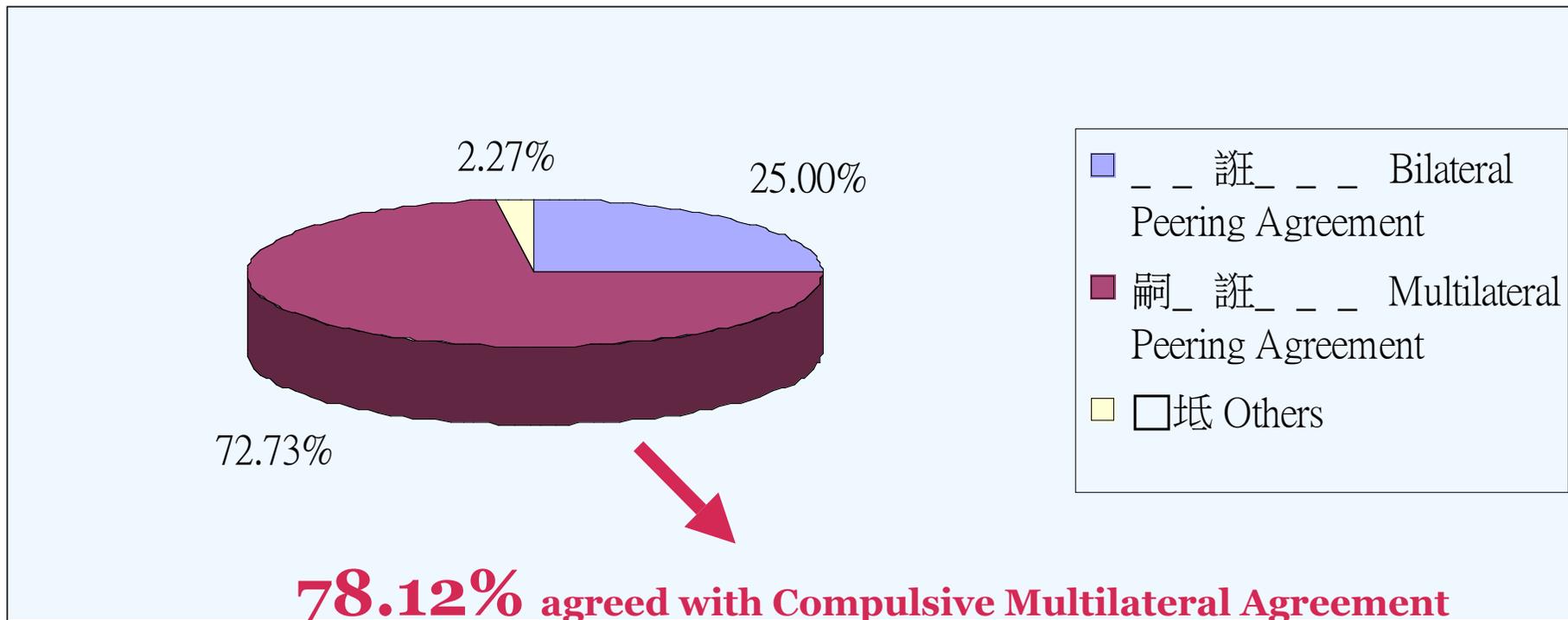   - **Academic Institutions (6)**
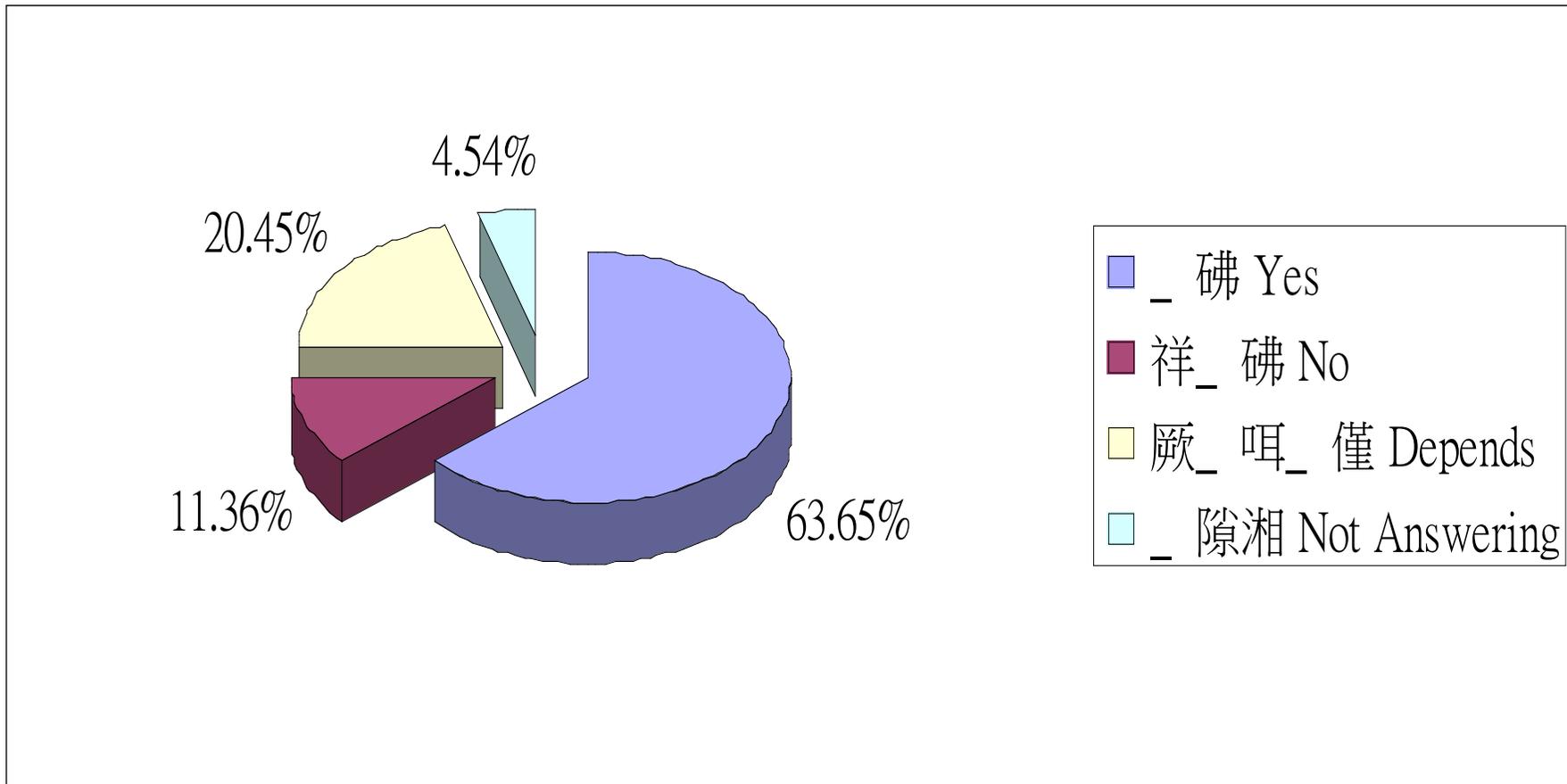   - **ISPs (66)**

IXs' Positioning/Service
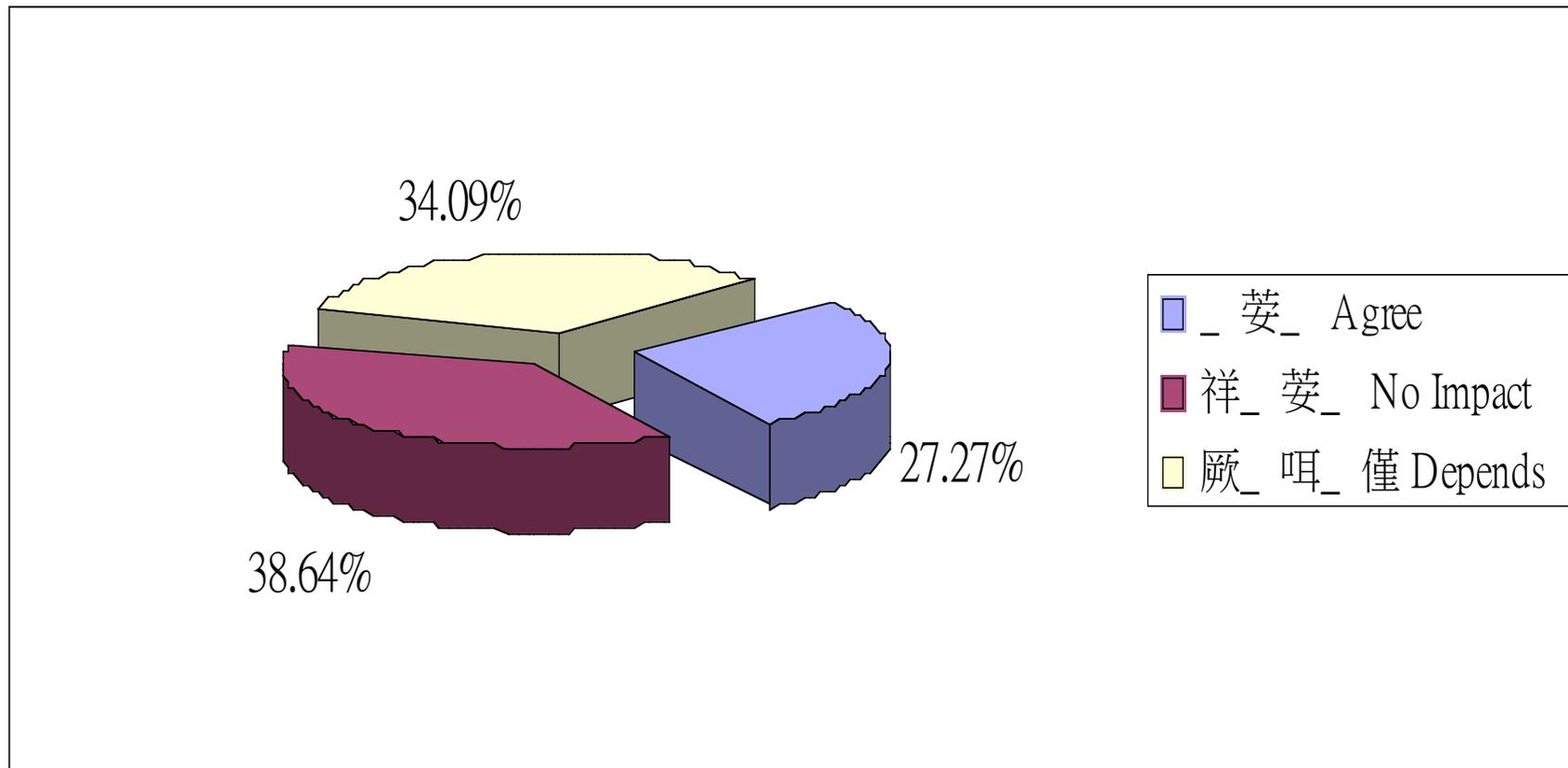
Peering Policy

Multilateral or Bilateral?

2.27%   25.00%

72.73%

- ☐ _ _ 誆_ _ _ Bilateral Peering Agreement
- ☐ 嗣_ 誆_ _ _ Multilateral Peering Agreement
- ☐ 坁 Others

78.12% **agreed with Compulsive Multilateral Agreement**

Peering Policy

Acceptance of Multilateral Agreement?

4.54%

20.45%

11.36%

63.65%

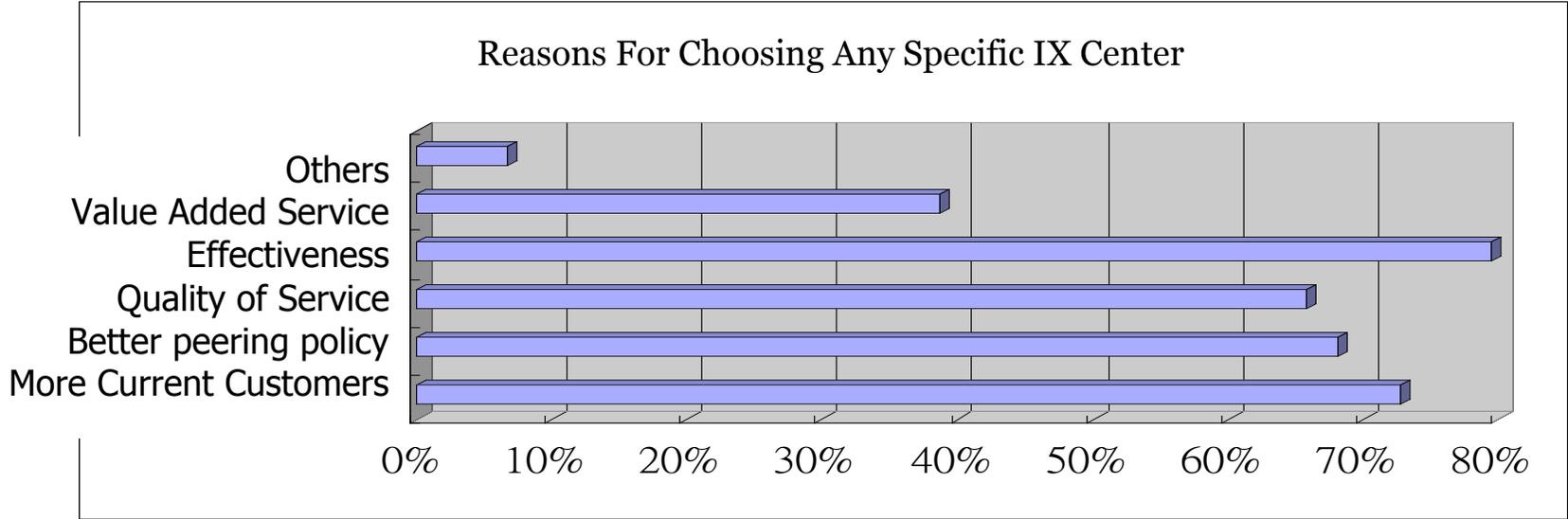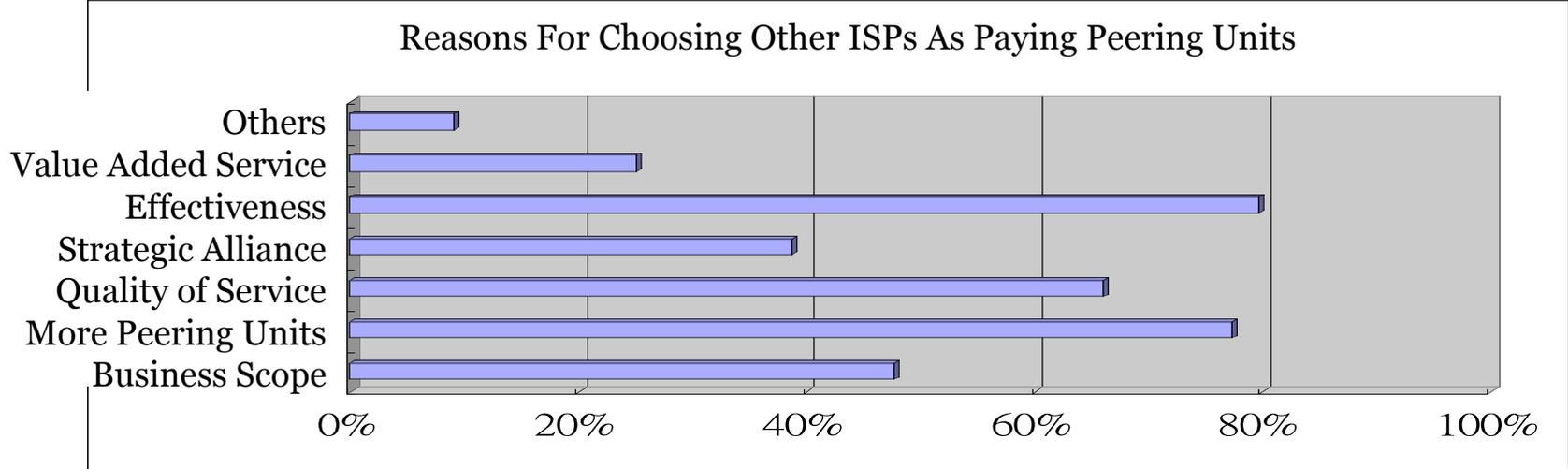Legend:
- 碚 Yes
- 祥_ 碚 No
- 厥_ 咡_ 僅 Depends
- _ 隙湘 Not Answering

Peering Policy

Impact on willingness to join IX if peering units need to increase bandwidth when the usage level exceeds certain percentage?
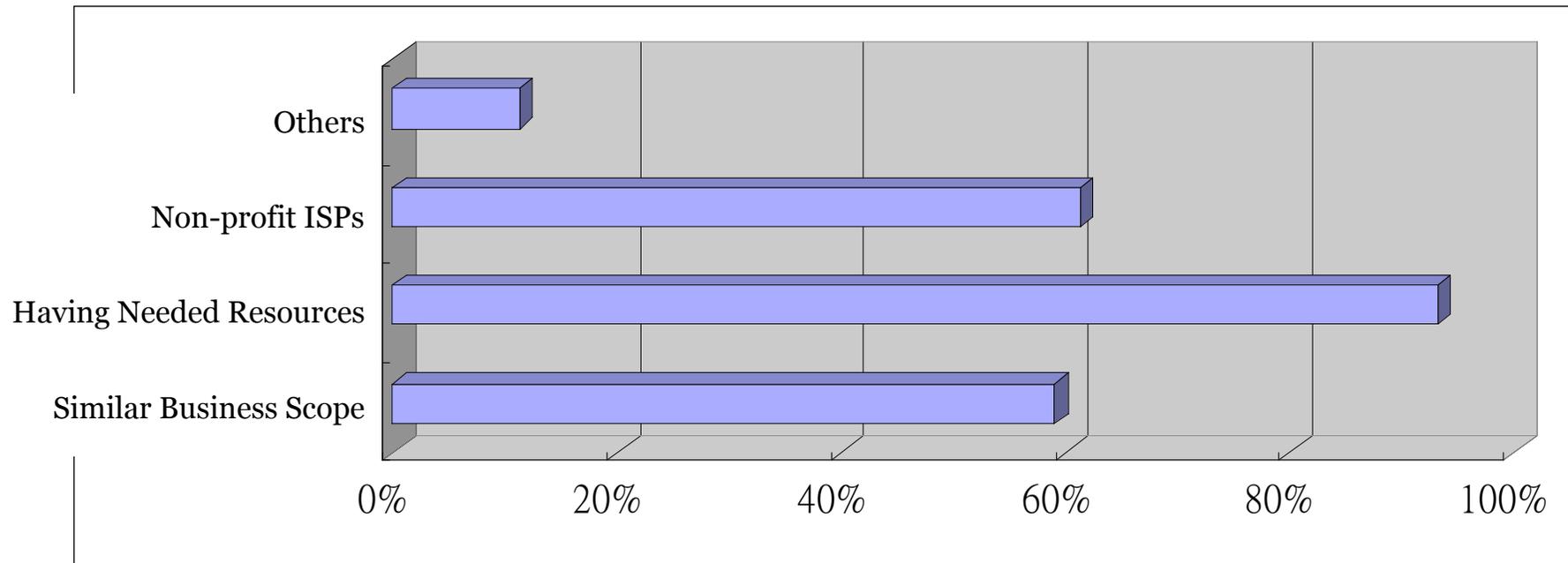
34.09%

27.27%

38.64%

□ _ 萎_ Agree

□ 祥_ 萎_ No Impact

□ 厥_ 咀_ 僅 Depends

Peering Incentives Among ISPs

Reasons For Choosing Other ISPs As Paying Peering Units

Reasons For Choosing Any Specific IX Center
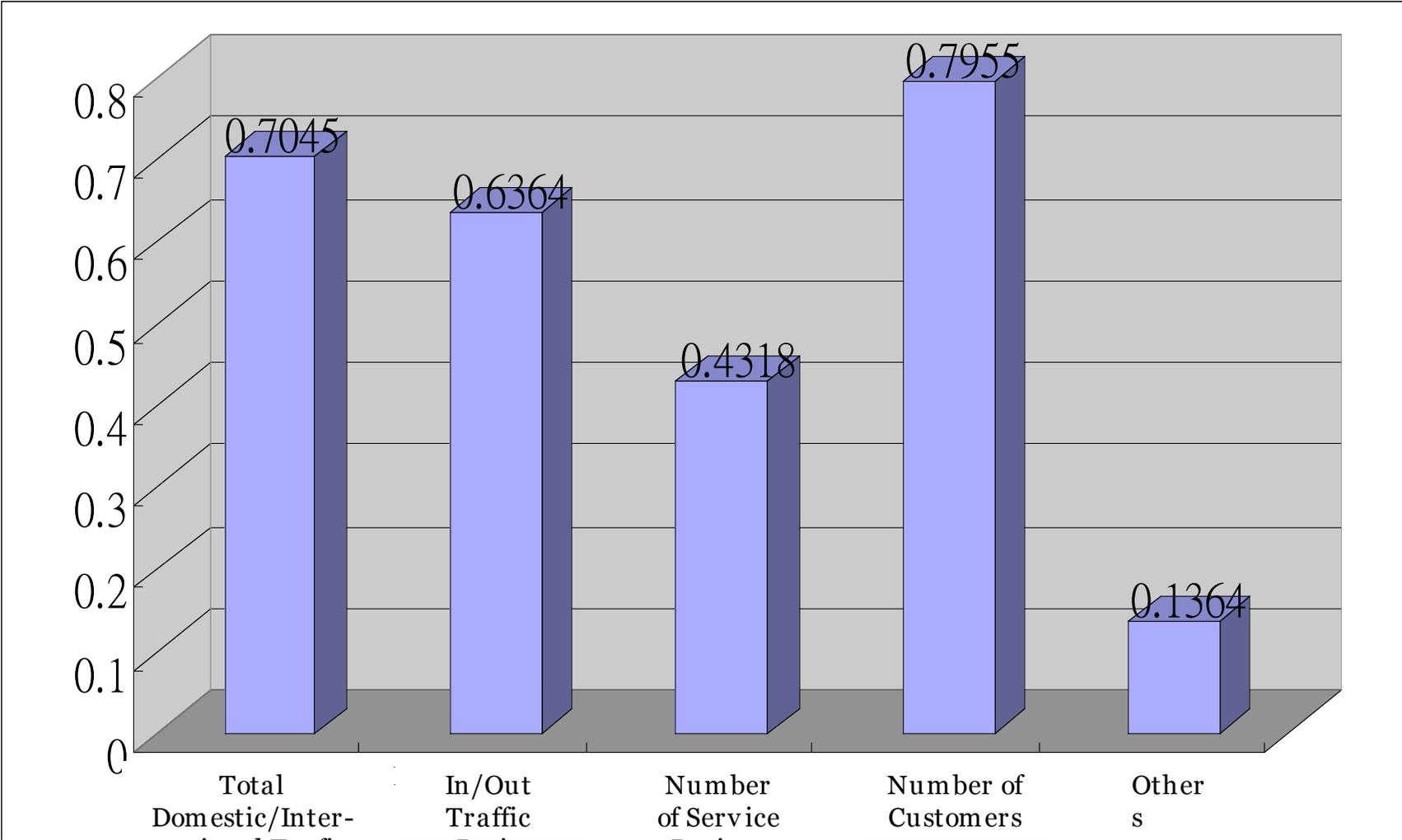
16

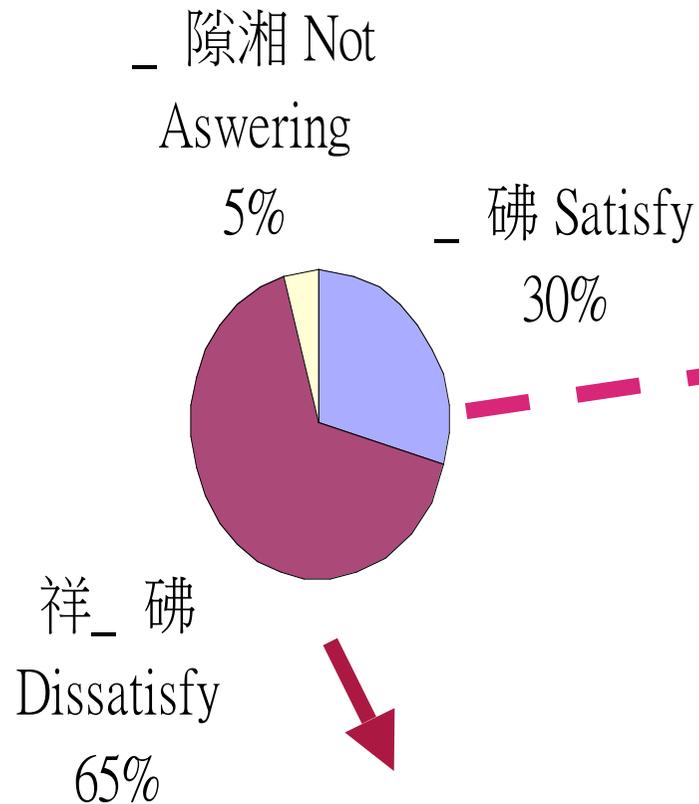# Peering Incentives Among ISPs
Criteria of Choosing Free Peering Unit(s)

Measurement Criteria for the Size of Domestic ISPs

Satisfaction with ISPs' Peering Environment

隙湘 Not Aswering 5%

碑 Satisfy 30%

祥_碑 Dissatisfy 65%

65.51% thinks that IXs should be founded and supported by the government

Transit 24%

IX 39%
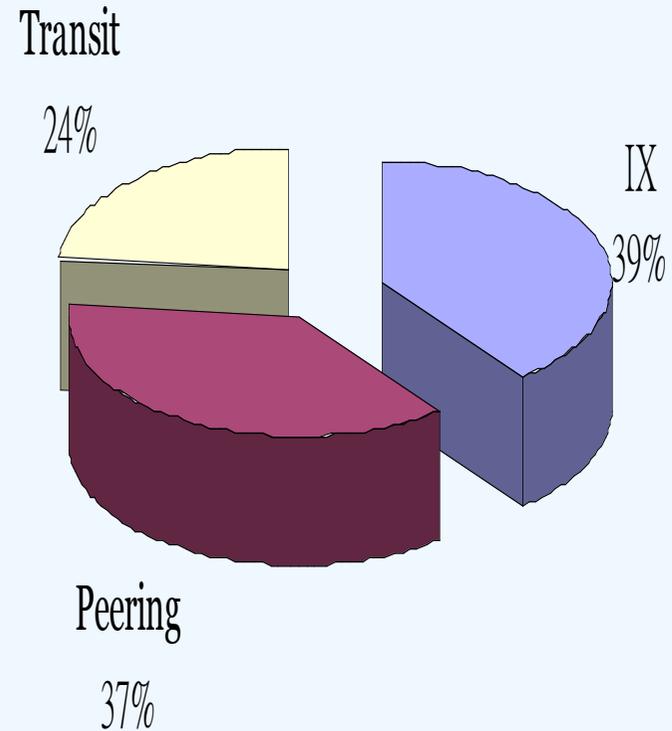
Peering 37%

The Necessity of Revising Related Telecommunication Laws of Peering Regulations for Type II Telecom Companies

邿隙湘 Not Answering

_ 蚰荽_ No16%
Difference
11%

刣猁 Yes
48%

祥刣猁 No
25%

Legend:
- 刣猁 Yes
- 祥刣猁 No
- _ 蚰荽_ No Difference
- 邿隙湘 Not Answering
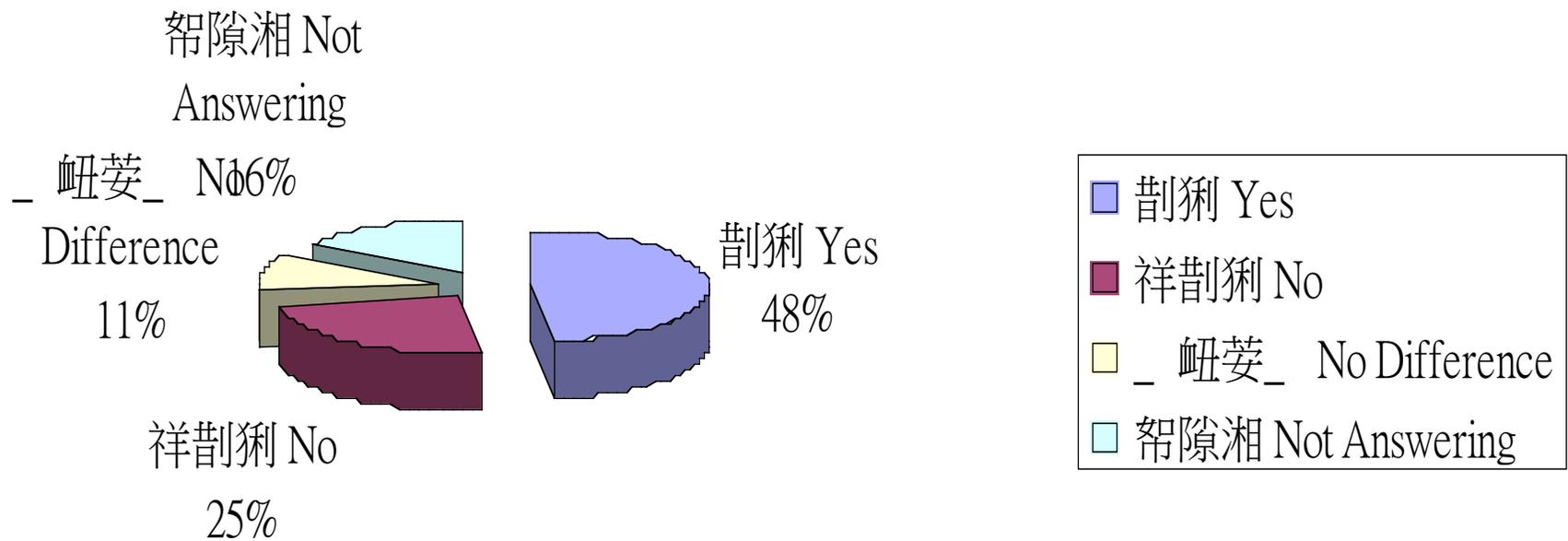
Domestic/International Traffic Ratio

_ 侷霜講
International
Traffic Volume
32%

_ _ 霜講
Domestic Traffic
Volume
68%

- ☐ _ 侷霜講 International Traffic Volume
- ☐ _ _ 霜講 Domestic Traffic Volume
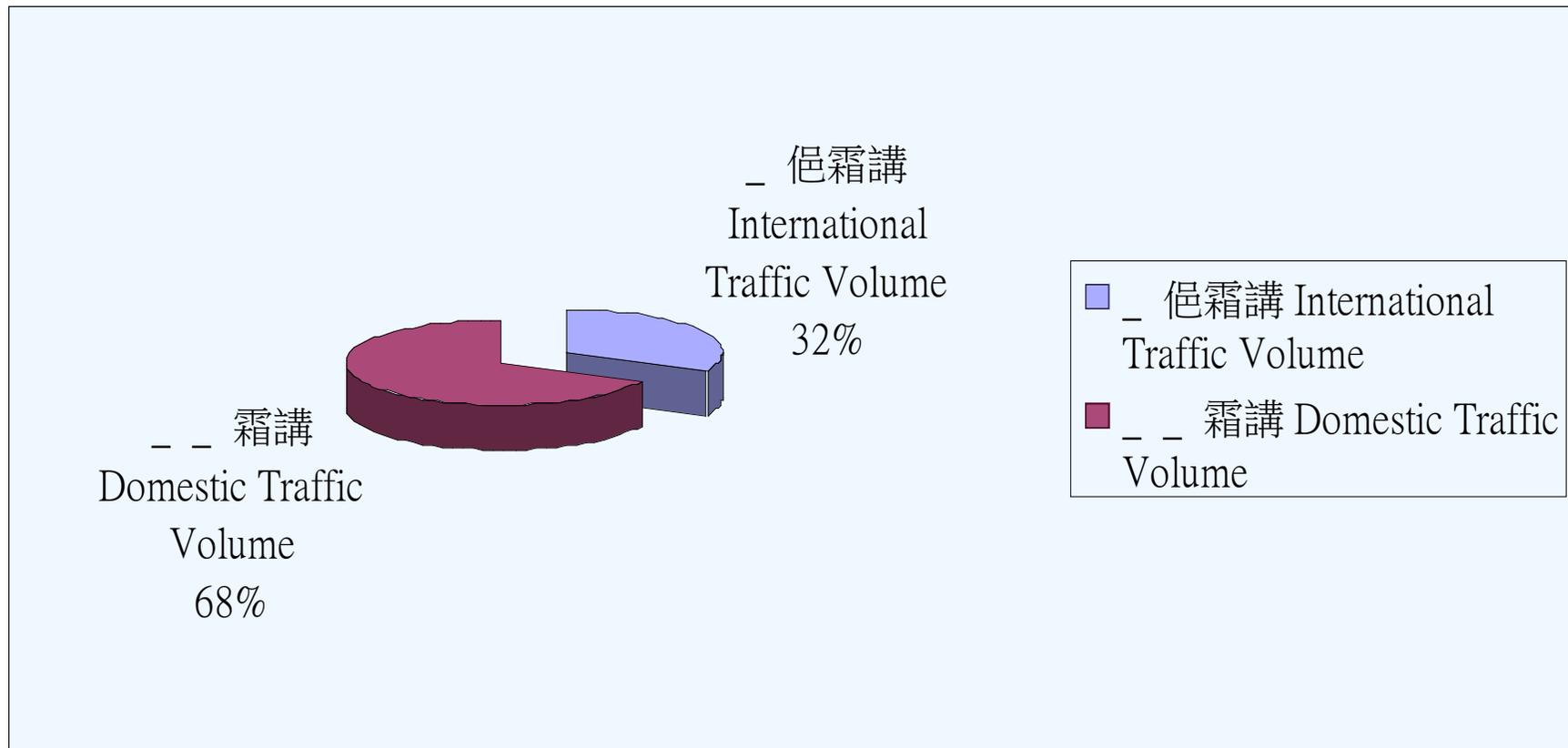
3. Issues/Phenomena

- Domestic Traffic Volume Heavier Than International Traffic Volume ➔The Demand of Domestic Peering Stronger Than International Peering

  - In countries such as Malaysia or Singapore, the demand for International peering is stronger than domestic peering (international traffic accounts for 80-90% of total traffic volume)

- Expenses (cost/income) are critical to peering decision; even if the peering is free, line cost still a major concern

  - In countries like Japan, Korea, Malaysia and Singapore, the domestic peering cost is comparatively higher.

3. Issues/Phenomena (Cont')

- In Taiwan, IXs are mainly run by ISPs which lack neutrality in operation
  - In countries like Japan, Korea and Malaysia, IXs are established by ISPs without governmental involvement and intervention
  - In countries like Korea and Singapore, the huge gap in size among ISPs results in unfair competition.
- ISPs/IXs demand minimum governmental intervention, but expect government to help improve the unfair competition environment
- Domestic IXs lack the management mechanism for Service Level

	Objectives	Strategies	Advice on Implementation Priorities
Objectives/ Strategies/ Advice on Implementation Priorities	Establishing Better Operational Mechanism	Establishing Proper Operational Guidelines	-Scope of Operational Guidelines
		Establishing Effective Supervising and Appealing Mechanism	-Scope of Supervision and Management -Positioning of Supervision and Management organizations
	Enhancing Service Level/Effectiveness	Drawing up Peering Policies	-Establishing Peering Policies -Implementation Strategies -Peering Examples
		Establishing Supervising Mechanism	-Proposing Solutions for Supervising Techniques
	Seeking for Reasonable and Transparent Pricing Guidelines	Cost-Effectiveness Analysis	-Cost-Effectiveness Analysis for Consideration Factors
	Drawing up Proper Guidelines	Proposing Feasible Guidelines	-Self-disciplinary Guidelines -Possibility of Revising Current Regulations/laws

5. Proposed Solutions

(1) Establishing Well Operational Mechanism

Solution 1: Establishing Supervising Institution

- Current status unchanged: DGT authorize TWNIC to supervise the operation
- Government assembling relevant parties to form a new organization

Solution 2: Transforming the TANet into Incorporated Entity and Establishing new IX

Solution 3: ISPs Co-funding new IX

(2) Enhancing Service Level / Effectiveness

- Public Peering
  - Encouraging IXs to provide incentives to increase ISPs' willingness to connect
  - Leveraging the contractual relationship among IXs and ISPs, and asking ISPs to provide various free bandwidth based on their business scopes. ISPs of the same business scope should provide with each other free fixed bandwidth and ensure the quality of free bandwidth
- Private Peering
  - Every ISP setting its own peering policy (for instance, ISPs can provide free peering or special discounts subject to their different business scopes)
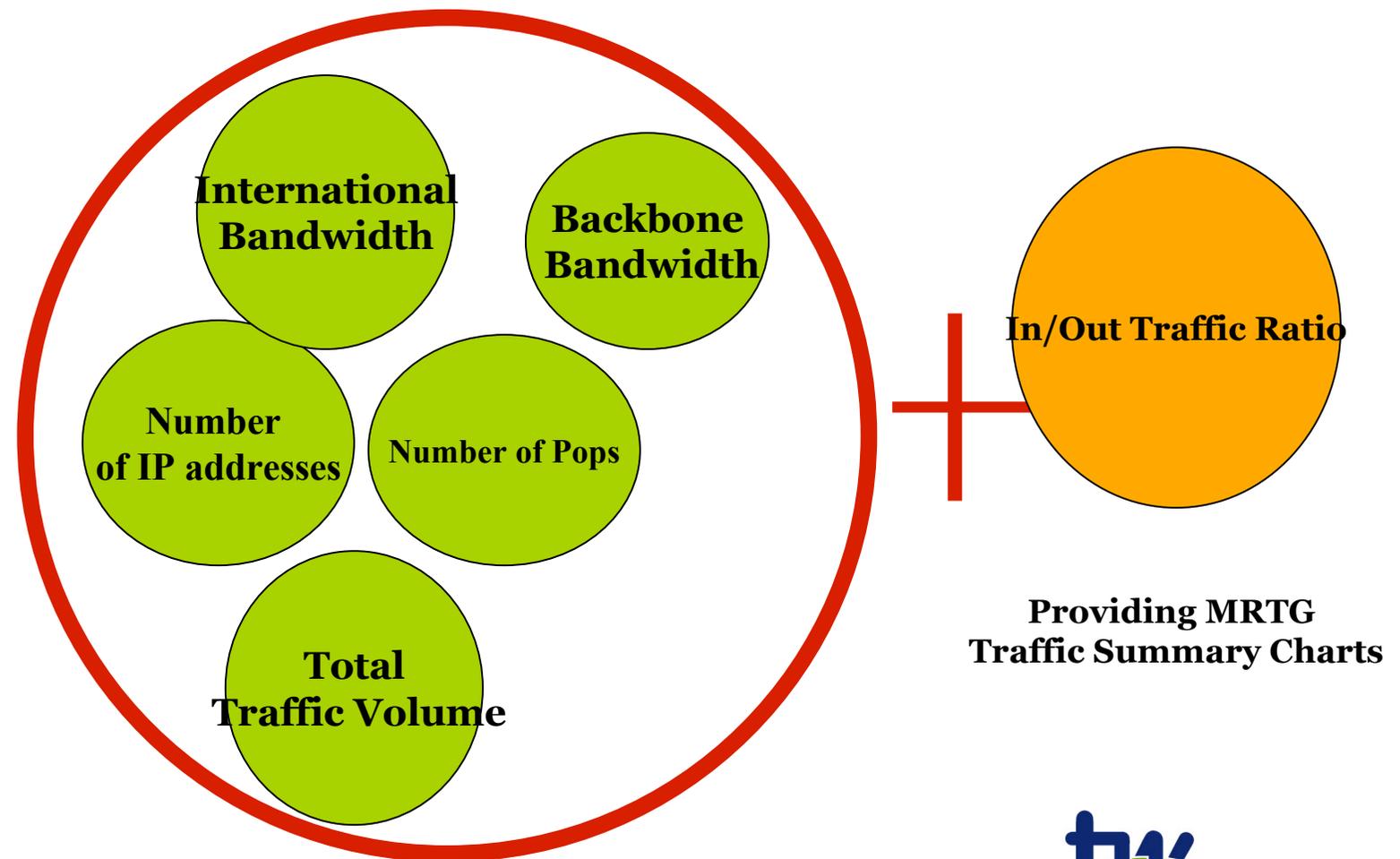
5 Essential Elements of Evaluating ISPs' Business Scope

Element	Evaluation Benchmark
Number of IP Addresses	Based on data released by TWNIC (including information from TWNIC, APNIC, and INTERNIC)
Number of Pop	To be qualified as a POP, anyone of the following benchmarks has be met: (i) Having over X broadband users; (ii) Having over Y dial-up ports; (iii) Total amount of effective bandwidth of leased line users needs to exceed N Mbps
Total Traffic Volume	ISPs providing summary of average monthly actual traffic volume with other ISPs; Providing MRTG traffic Summary chart is needed
Backbone Bandwidth	Defining the bandwidth among POPs located in any 2 different cities as the backbone bandwidth, and using the average of any 3 backbone bandwidths as the benchmark; For ISPs with less than 3 backbone bandwidths, Using the average of all backbone bandwidths
International Bandwidth	Based on the copy versions of Marine Cable Contracts and International ISPs' Contracts, and international ISPs' transit contracts.

Note: Except for Number of IP addresses, other 4 elements can be examined by a trusted 3rd party on regular basis.

Considerations Factors for Peering Among ISPs

International Bandwidth

Backbone Bandwidth

Number of IP addresses

Number of Pops

Total Traffic Volume

In/Out Traffic Ratio

Providing MRTG Traffic Summary Charts

Proposing Solutions for Supervising Techniques

| Solution	Description	Pros/Cons

Layer2	• IXs setting up a VLAN between the peering of any 2 ISPs
	    -Without bandwidth control
	    - With bandwidth control
		Pro: adjusting and compiling statistics of the VLAN between any 2 ISPs with ease
		
		Con: the configurations of all ISPs and IXs have
		    to be changed with the adding and changes
		    of any specific ISP

Layer3	• Using Access Control • All peering among ISPs need to go through IXs' Routers	**Pro:** IXs can provide detailed traffic summaries for any two ISPs' revenues and expenses apportion. IX can also conduct access control between two ISPs to avoid attack or piracy on other ISP's bandwidth **Con:** through public switch, ISPs have only one function: peering; IXs' operation becomes more complicated and costs higher
Layer2+Layer3	➤Using Layer 3 exchange model and setting up VLAN as well as bandwidth	**Pro:** the relationship among ISPs is like the leased line of fixed bandwidth which only needs one port **Con:** the bandwidth among VLANs cannot be shared with each other

3. Seeking For Reasonable And Transparent Pricing Guidelines

- **Making public pricing formula (cost analysis)**
- **Prices be disclosed on websites**
- **Comparing price internationally**
- **Predatory pricing not allowed**
- **With the concept of "wholesale prices"**

4. Drawing Up Proper Guidelines

- **Short Term**
  - ISPs Self-Discipline

- **Mid Term**
  - Revising Peering Regulation

- **Long Term**
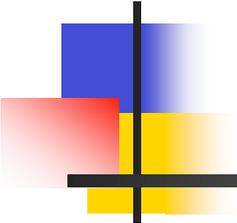 - Revising Telecommunications Law

6. Next Steps and Implementation Strategies
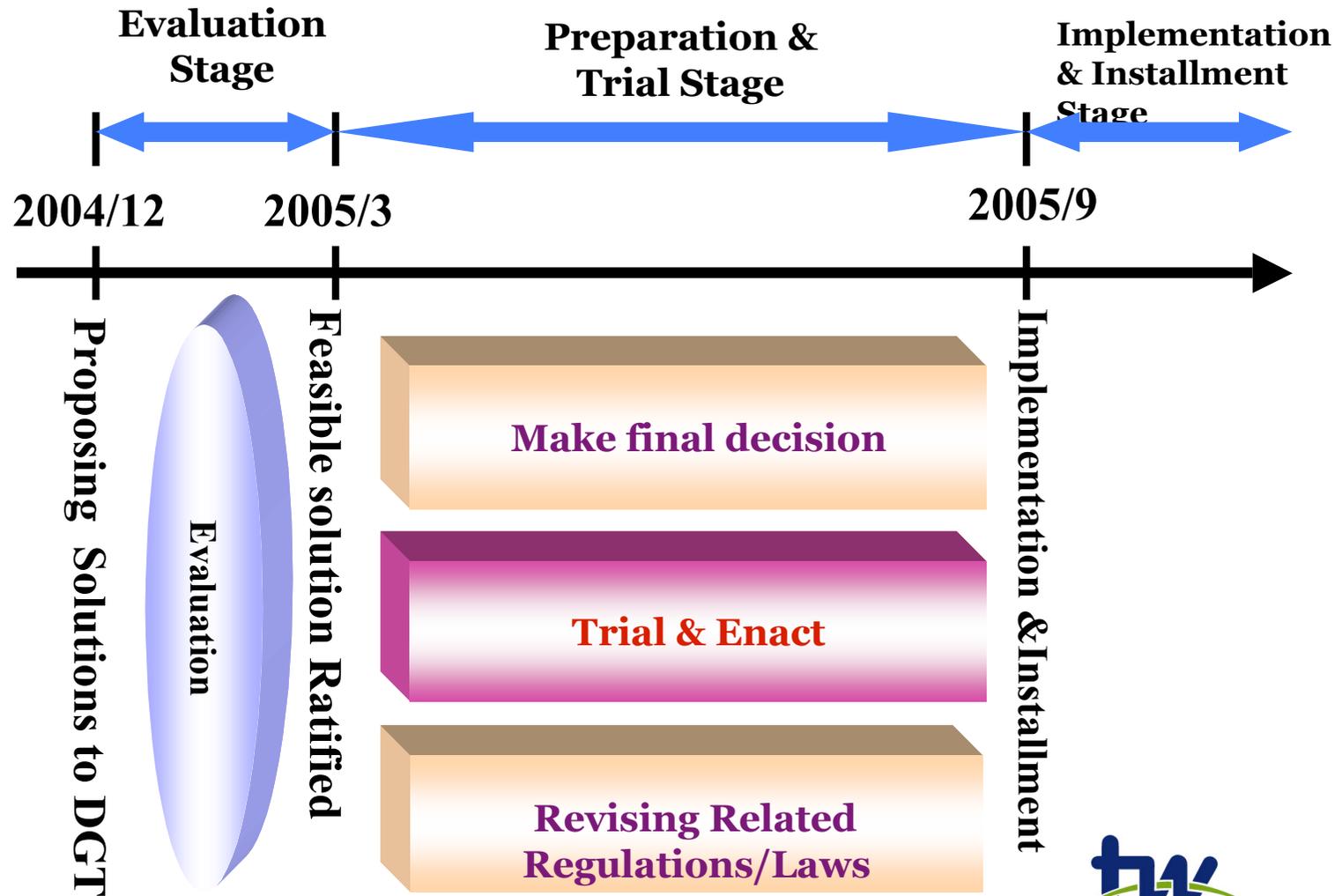
7. Conclusion

- **It is necessary to have IXs in Taiwan.**

- **ISPs are not necessarily the best IXs. Only impartial and neutral institutions can best perform the functions of IXs.**

- **Although countries around the world rarely legislate for the regulation of IXs, it does not mean that the current regulations cannot or should not be revised.**

- **The success of IXs' operation relies on the balance of free market competition and proper governmental intervention.**

- **By presenting the research results, we hope both governmental departments and industry players to make contributions based on fair and reasonable principles towards better domestic IX related services, so as to create an environment of Internet communication which promotes fair competition.**

Questions and Suggestions