

# **Concentration**

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# **D i f f u s i o n**

... measured using IPv4 Address Space Distribution

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# ***What could one say about concentration/diffusion of RIPE NCC resources?***

“Current (since the beginning of 2006) RIPE NCC distribution *has over three quarters of the resources going to just* **271 LIRs\***”

“**70 dozen** LIRs account for 90% of all consumption in the RIPE NCC region...”

“**296 LIRs\*** held 79.28% of RIPE NCC’s delegated address space as of December 2007”

# **RIPE LIR Quintiles**

## ***by share of address space***

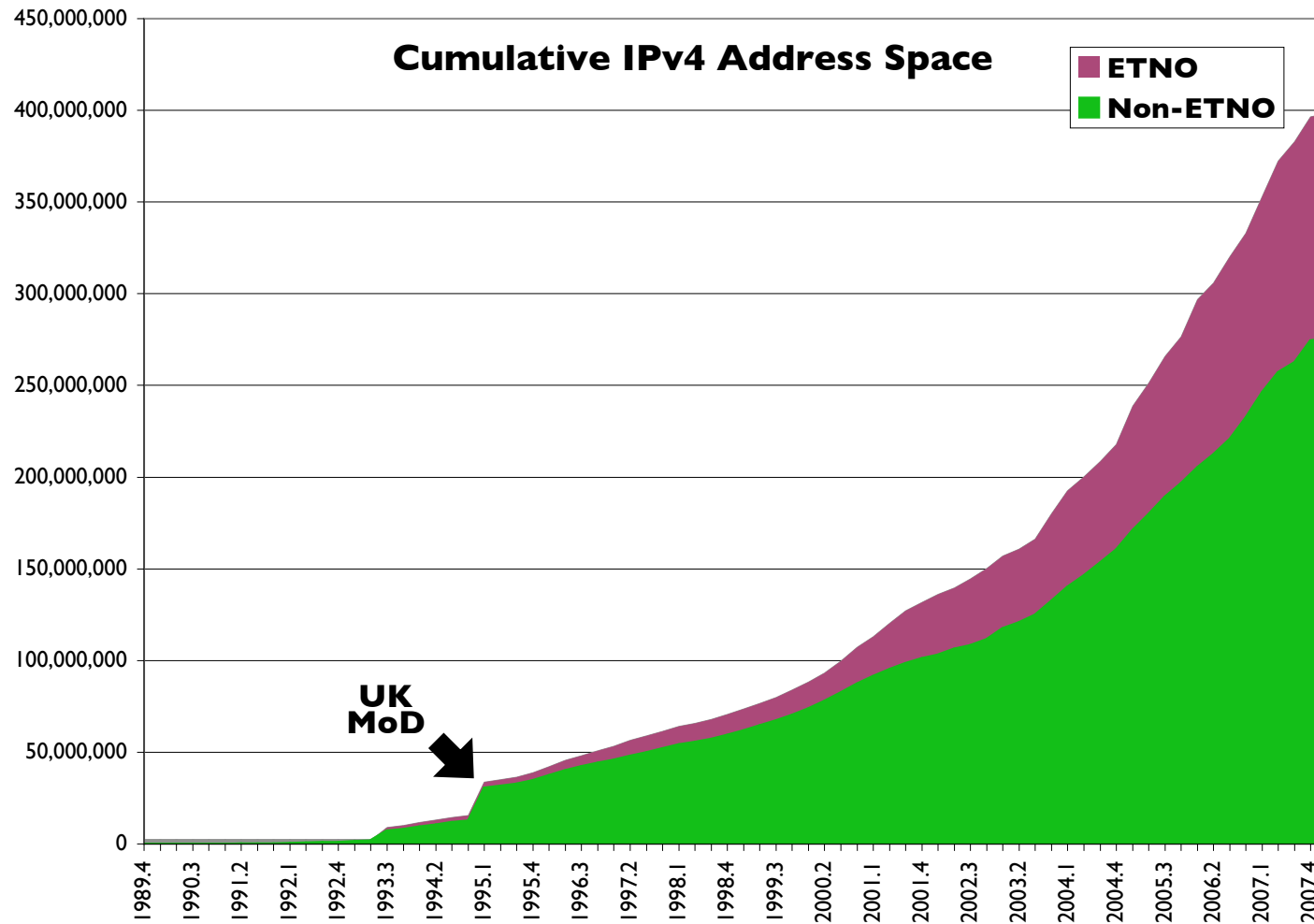
<b>Share of total delegated address space</b>	<b>Number of RIPE NCC LIRs* sharing this quintile</b>
<b>0 - 20%</b>	<b>4 (0.08%)</b>
<b>20 - 40%</b>	<b>16 (0.3%)</b>
<b>40 - 60%</b>	<b>50 (0.94%)</b>
<b>60 - 80%</b>	<b>229 (4.31%)</b>
<b>80 - 100%</b>	<b>5020 (94.38%)</b>

**\*Unless otherwise indicated, for this analysis “LIRs” are defined as the combined IPv4 delegations of notionally joint operating institutions, even if they straddle multiple LIRs and national jurisdictions. For example, the nine “Easynet” LIRs would be treated as a single LIR. To avoid confusion, analyses using data for unaggregated LIRs are marked as “Atomic LIRs”.**

# RIPE LIR Comparisons by LIR\* size

Total size of combined delegations	Number of RIPE NCC LIRs* in this group	Share of RIPE NCC space held by this group (/24 equiv.)
<b>/14 or more</b>	<b>203 (3.8%)</b> [ARIN equivalent: 24 / 1.3%]	<b>1.16m (75.5%)</b> [ARIN equivalent: appx. 323k / 83.6%]
<b>/14 - /16</b>	<b>416 (7.8%)</b> [ARIN equivalent: 56 / 3%]	<b>181k (11.8%)</b> [ARIN equivalent: appx. 26k / 6.6%]
<b>/16 - /20</b>	<b>3858 (72.5%)</b> [ARIN equivalent: 1029 / 55.1%]	<b>190k (12.3%)</b> [ARIN equivalent: appx. 33k / 8.8%]
<b>less than /20</b>	<b>843 (15.8%)</b> [ARIN equivalent: 777 / 41.6%]	<b>6.5k (0.42%)</b> [ARIN equivalent: 4k / 1.1%]

# Possible factors contributing to RIPE member economy network concentration (?)



**LIRs controlled by European Telecommunications  
Network Operators' Association (ETNO) Members**

# The *right* way to assess concentration/diffusion

- Recognize that the phenomenon has two dimensions: how fast members are growing at every level, and how quickly new entrants are emerging
- Remember that, in general, concerns about growth of the largest members is warranted only to the extent that they inhibit (through their existence or actions) the new establishment or growth of other members
- Wherever possible, use formal methods to capture both dimensions, and thereby illuminate the implied risk that one subset of members could be adversely affecting the others

# Herfindahl-Hirschman Index (HHI)

- **HHI** provides a single value reflecting the number and size of firms in relation to the size of the overall industry, and suggests the mix of competition/market power that characterizes the industry overall
- Calculated by summing the squared market shares of each participating firm/institution in a given sector; maximum: 10,000 (one firm with 100% share),
- Decreasing in HHI generally indicate a loss of pricing power & increase in competition, whereas increases imply the opposite

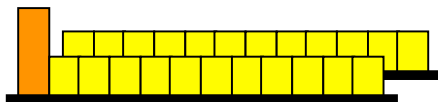
# Illustration: Simulated HHI Values



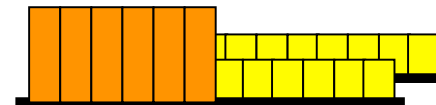
**3 LIRs, each with /24:  
HHI = 3267**



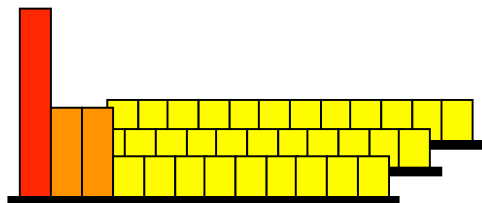
**12 LIRs, each with /24:  
HHI = 833**



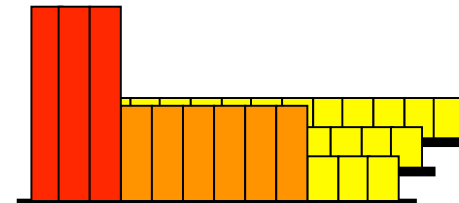
**24 LIRs, 1x /16, 23x /24:  
HHI = 8422**



**24 LIRs, 6x /16, 18x /24:  
HHI = 1628**

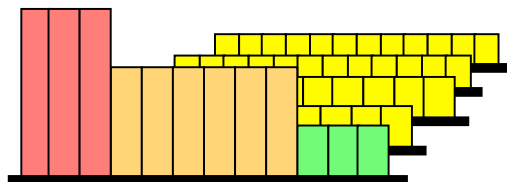


**36 LIRs, 1x /8, 2x /16, 33x /24:  
HHI = 9836**



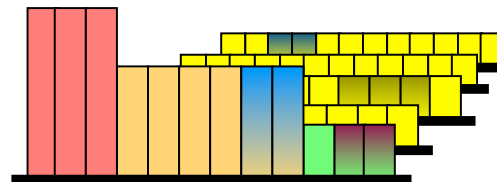
**36 LIRs, 3x /8, 6x /16, 27x /24:  
HHI = 3281**

**ARIN  
Region  
Est.  
2006-07**



**1866 LIRs,  
24x /10, 56x /15, 1029x /20, 777x /24:  
HHI = 335**

**RIPE  
Region  
2006-07**



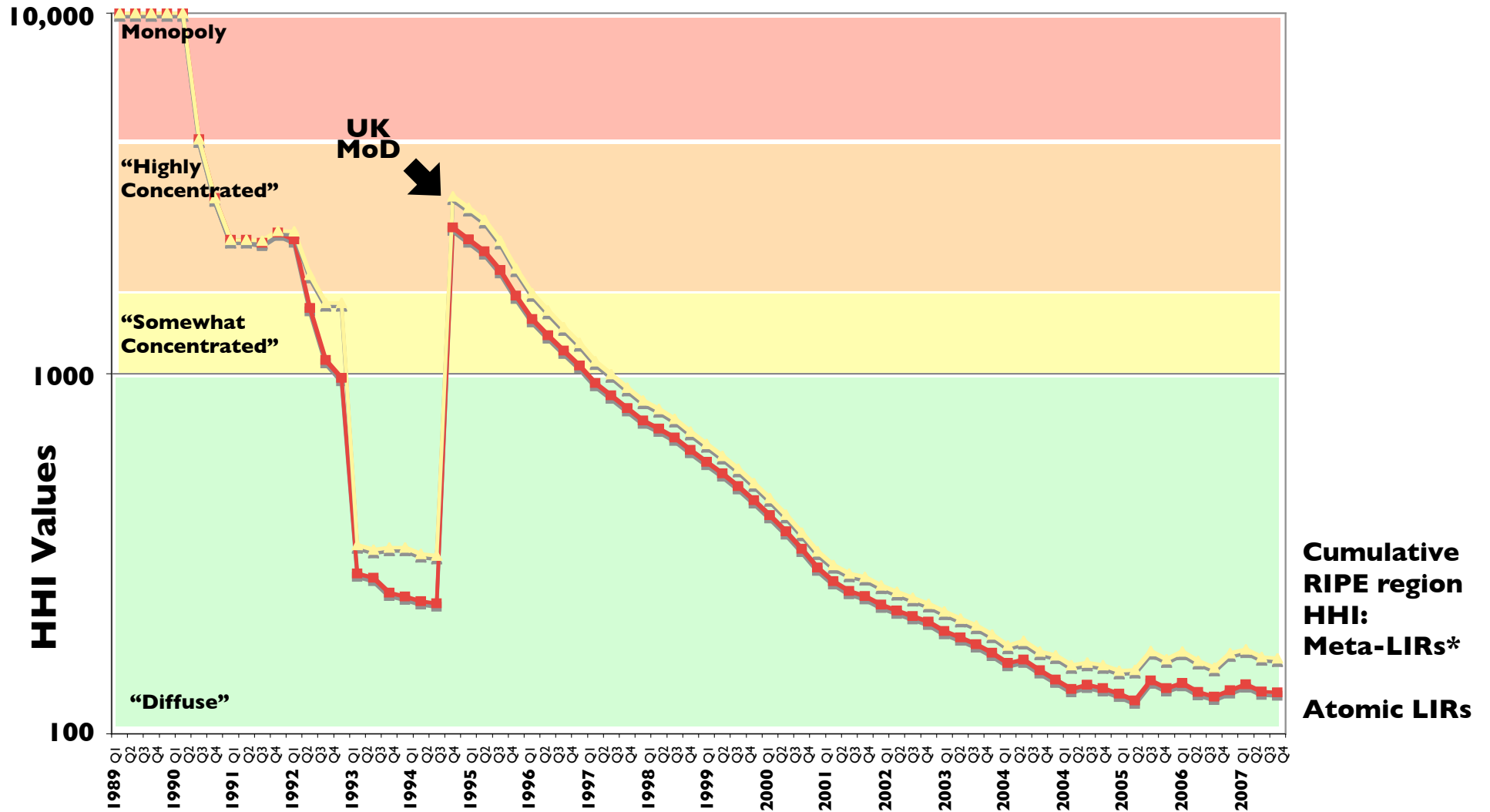
**2544 LIRs, 2460 “atomic LIRs” plus  
84 “meta-LIRs” encompassing  
202 nat’l-level subsidiaries  
(uk.ispX + de.ispX + fr.ispX, etc.)  
HHI = 311**



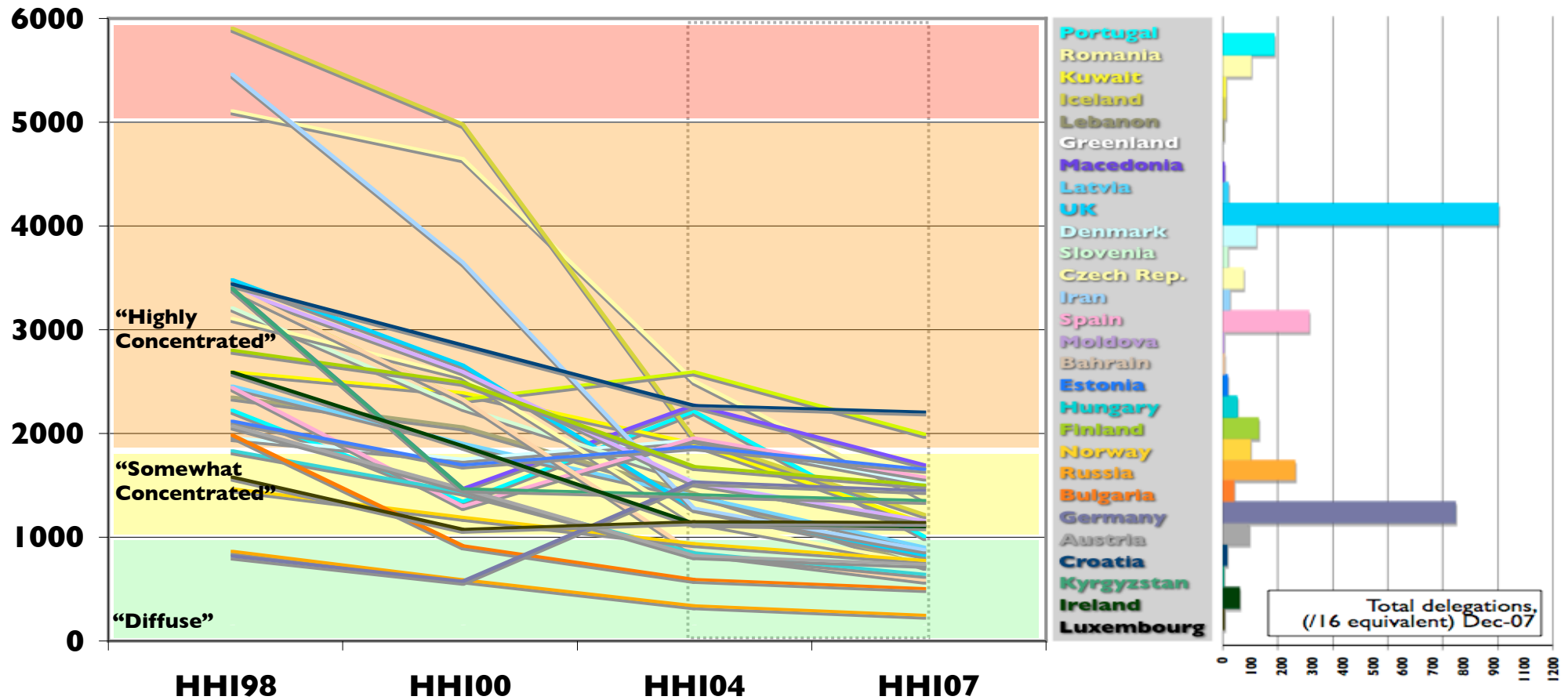
# HHI & Competition Policy

<b>Market Structure &amp; Interpretation</b>	<b>Current HHI</b>	<b>Dynamic Change</b>
Conditions/environments that are less likely to have anti-competitive effects.	<1000 1000-1800 >1800	Any <100 <50
Conditions that “may raise significant competitive concerns.”	1000-1800 >1800	>100 50 – 100
Conditions that “exist in already highly concentrated markets”	>1800	>100

# RIPE NCC Concentration/Diffusion

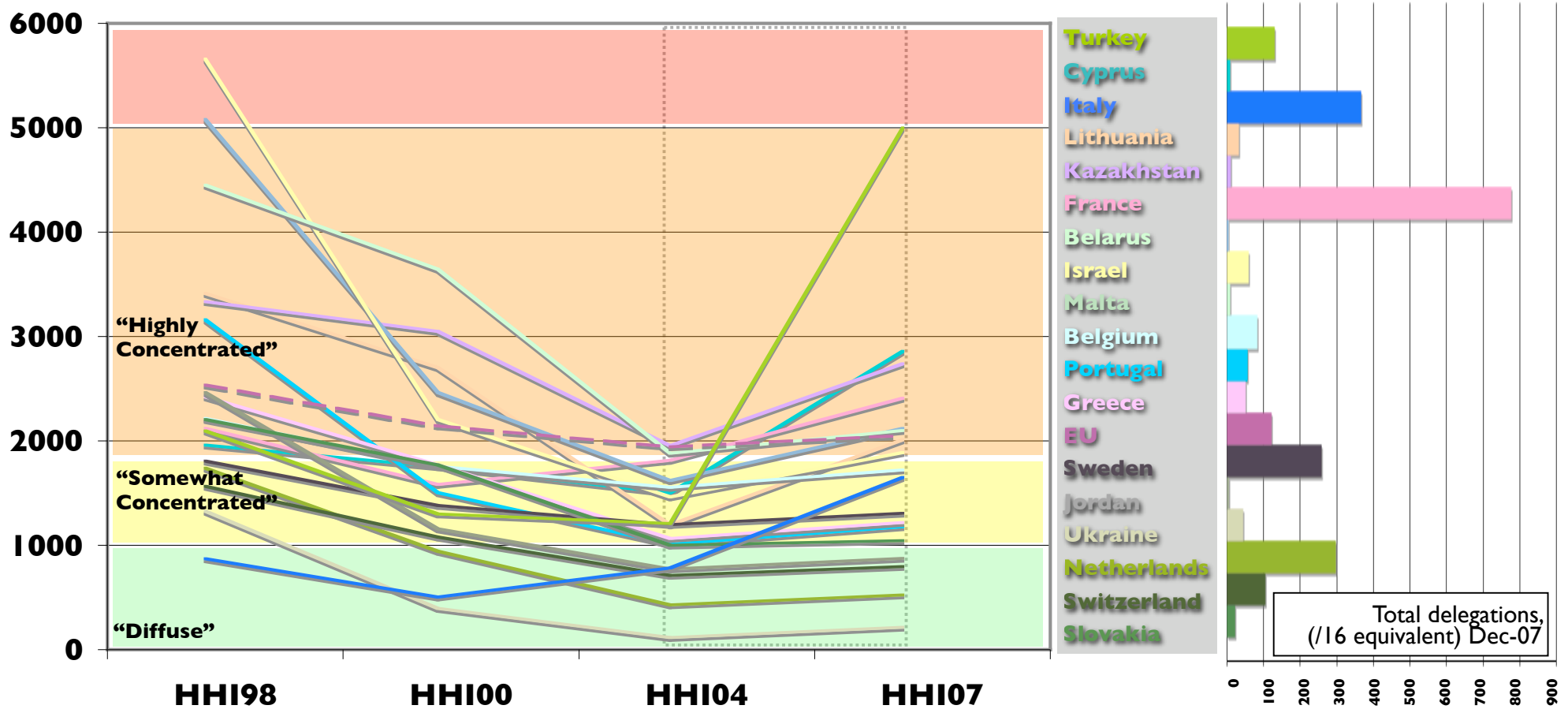


# RIPE Economies Becoming Less Concentrated 2004-2007



(most became *competitive* after 2000)

# RIPE Economies Becoming More Concentrated 2004-2007



(most were also/already highly concentrated by 1998)

# Observations

- Our study is about the RIPE region, others may differ.
- There are concerns about concentration tendencies.
- Presently our study does not confirm this for the RIPE region.
- Our study does confirm concentration in a few economies.
- Our study suggests that address space distribution policies today are at least not a significant factor, they possibly are helping distribution.

# Observations

- As the unallocated pool of IPv4 addresses exhausts, concentration and impediments to new entrants will be blamed on this fact ... and on our policies.
- We have to keep diffusion and openness to new entrants in mind when developing address space distribution policy.
- We have to keep watching trends in this area.
- Other methods to study this? Better methods?

Questions ?

Answers!

Policy discussion in Address Policy WG please.