REALITY AND PERSPECTIVES OF INTERNET EXCHANGE POINTS IN THE ARAB REGION

“TOWARDS UNLOCKING REGIONAL INTERCONNECTION OPPORTUNITIES”
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PURPOSE AND APPROACH

• Build on previous regional work
• Analyze data collected from the region
  • Survey conducted with stakeholders from the region
  • Regional traffic statistic reports from various sources
• Assess the peering ecosystem in the Arab region
• Elaborate a vision and roadmap
• Agree on the way forward
• Collaborate and plug with other regional activities to implement

Grow and develop the IXP ecosystem in the Arab region
Boost regional connectivity and peering on a pan-Arab level
KEY FACTORS FOR IXP GROWTH

- IXPs follow growth patterns of the overall Internet ecosystem
- Regions with strong digital economy have more carriers – service providers – data centers …
  → Higher IXP density

Macro-economic factors

Supportive national regulations and policies

Level of infrastructure development

Community engagement and stakeholder support
IXPs are a critical enabler for the development of the Internet ecosystem.

Source: Packet Clearing House, Internet exchange point directory reports – Sep’18
WHY GROW PEERING

Keep local traffic local? ... not only ...

• IXPs enhance the domestic Internet economy:
  • Affordability: more bandwidth at lower prices
  • Service quality / user experience: lower latency for local traffic
  • Economy of scale for local content industry: reach to broader customer base
  • Competitive wholesale transit: wider options of carriers
  • Reliability / resilience: quick rerouting scenarios in case of international cable disruptions

• IXPs are natural host for Internet key services: ccTLD DNS server, root server mirrors, traffic measurement tools ...
Some IXPs have the opportunity ...

If supported by a liberalized enabling environment and have access to competitively priced international cables.

Are able to grow a strong user base by adopting well-defined policies and developing a well-established facility.
IS THERE A NEED ... ?

Internet traffic continues to grow in the Arab region

- Individuals using the Internet represent 43.7% \( \text{(Source: ITU “ICT Facts and Figures 2017” Report)} \)
- IP traffic is growing fastest in MEA with a 42% CAGR \( \text{(Source: CISCO Visual Networking Index 2016-2021)} \)
- Fixed BB subscribers >29.5 million and 269 million Mobile BB subscribers in MENA \( \text{(Source: IDATE September 2017)} \)

Opportunities for the region

- Geographical proximity of Arab countries
- Commonality of language and culture
- Similarity of online content needs and usage trends

Traffic between Arab countries continues to bounce through various paths across the world

Need becomes more tangible as demand grows for

- Bandwidth greedy content
- Time sensitive services
EMEA region one of the most consistent growth regions of the world due to its size and important crossroads of Mediterranean Sea and Suez Canal.

(Source: Submarine Telecoms Forum Industry Report October 2016)
INTER-REGIONAL INTERNET BANDWIDTH

• Global Internet bandwidth in 2017 295 Tbps out of which 66.5 remains intra-regional

• Africa and Middle East had highest growth rates for international Internet capacities between 2013 and 2017 - Compound annual rate for Africa 46% and for ME 43%

(Source: TeleGeography 2017)
**CABLE INFRASTRUCTURE AND REGIONAL CONNECTIVITY**

Region enjoys good international connectivity through well developed submarine infrastructure

- Continued Internet traffic growth
- Geographic location and characteristics (no land-locked countries – on the path between Asia and Europe)

On a sub-regional level cable infrastructure is less developed

- Inter-regional connectivity and inter-linking of sub-regions not well served by submarine cable
- Internet traffic exchanged mainly through Europe over submarine cables as terrestrial infrastructure predominantly used for voice
- Operators from the region constantly growing connectivity to Europe and increasing interconnection capacities at major European exchange points
- ISPs within the region deploy caches to improve efficiency and lower cost
- Localization of traffic in the region (through cache like solutions) raises outbound traffic → indicating increased appetite for usage and high potential for growth
IP TRAFFIC FLOW IN THE ARAB REGION

- Country-to-country peering relationship far less developed in the Arab region
- Poor interconnection between Arab countries

Courtesy: M. Levy
INTERCONNECTION AND TRAFFIC FLOW IN THE REGION

• A vicious circle that needs to be broken
  • Highly priced local interconnection at landing stations → Operators collocated within same facility do not have meaningful interconnections
  • Scarcity of local content and locally hosted content → lack of need for interconnection among operators in the region

• Commercial decision of ISPs/TELCOs to expand infrastructure regionally and use it as direct route paths:
  • Not enough business incentive to peer at neighbouring countries
  • Traffic exchanged not worth investment in capacities and interconnection (highly priced in comparison to Europe)

• Global and regional content players need incentives to expand networks into the region
• Local content and regional infrastructure need to reinforce each other
• Concrete measures needed to effectively eliminate regulatory hurdles and regional interconnection barriers
### REGIONAL LANDSCAPE AS PER GLOBAL IXP DIRECTORIES ...

<table>
<thead>
<tr>
<th>Region</th>
<th>Members Avg</th>
<th>Active IXPs</th>
<th>Planned IXPs</th>
<th>Countries</th>
<th>Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>22</td>
<td>52</td>
<td>9</td>
<td>40</td>
<td>14</td>
</tr>
<tr>
<td>Asia-Pacific</td>
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<td>108</td>
<td>19</td>
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<td>Europe</td>
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<td>39</td>
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<tr>
<td>North America</td>
<td>40</td>
<td>103</td>
<td>16</td>
<td>3</td>
<td>92</td>
</tr>
<tr>
<td>Arab Region</td>
<td>13</td>
<td>14</td>
<td>6</td>
<td>15</td>
<td>19</td>
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</tbody>
</table>

Total of 28 IXPs located in 19 cites, within 15 countries
14 active IXPs and 6 planned

Source: Packet Clearing House
A LOOK AT ANOTHER REGION

- Africa - Q4 2017: 21 IXPs established in the last 10 years (Source: AU AXIS project)

An example from Africa:
- Study performed by ISOC within the African Union AXIS project
- Quantifying the impact of growing IXPs on ISPs
- Explore different ratios of peering vs. transit traffic percentage
- Measure respective monthly saving for ISP

Findings:
- Transit vs. peering ratio has a significant impact of ISP bottom line (more peering = larger cost saving)
- Increased peering enables ISP to reduce traffic contention ratio while maintaining positive bottom line
- To realize significant profit margins ISP needs to peer > 50% of transit capacity
- Transit demand will continue to grow even if peering ratio higher with continued increase in user demand
POLITICAL COMMITMENT TO BRIDGE THE GAP

• Support among Arab leaders to interconnect Arab Internet networks (2011 Sharm El Sheikh declaration of the Arab Economic, Development and Social Summit)

• Expert groups formed the Council of Arab Ministers of Communications and Information Technology

• Studies and reports conducted in cooperation with the ITU Arab Regional Office (2011-2016)

• Need expressed to establish a peering forum for the region

• Importance of cooperation among policy makers and operators stressed
SURVEY OF IXPS IN THE ARAB REGION

13 responses from 9 Arab countries (spanning IXPs – ISPs & Operators – Policy Makers & Regulators)
RESPONSE ANALYSIS AND FINDINGS

- Traffic exchanged during peak differs significantly (from 1 to >80 Gbps)
- Membership size varies greatly (from only a few to >50)
- Both traffic and membership size not proportional to respective Internet market
- Many IXPs are carrier/ISP collocated – noting that location neutrality is key to membership growth
- Avg. age across respondent IXPs 7.2 years
- Mandatory multilateral peering policy is prevailing (for 56% of respondents) – Possibly discouraging for large ISPs and an obstacle for IXP growth
- No transit services provided at almost all (with one exception)
- Membership policies seemingly progressive (some still restricting to local ISPs) – Yet members composition most generally covering ISPs only (with few exceptions)
RESPONSE ANALYSIS AND FINDINGS

• Governments play a prevailing role mainly in IXP setup (also in operation & management) – with few exceptions

• Incumbents rarely peer if government or incumbent are not involved in IXP operation & management

• Mostly either license is needed to operate IXP or regulatory restrictions are imposed on peering members – with very few exceptions

• Cross-border interconnection almost non-existent – with very few exceptions

• Mix of different institutional/governance models: independent non-profit, commercial or government-run entity

• Almost all respondents indicated IXP has positive impact on local Internet services (reducing latency and keeping local traffic local)

• Future plans to extend to new cities/regions and grow into regional hub indicated by most
THE GAP

- A considerable number of Arab countries with no active IXP – only a dozen in the region - many dormant

- Cross-border interconnection between local networks rare

- Regional gap between Arab countries in terms of IXP development

- Quality and price of Internet services affected by lack of adequate IXP infrastructure
  (Only 5% of popular web content hosted within the region and 85% of the region’s local traffic routed through Europe)

- Peering landscape in the region not adequately measured / analyzed

- No inclusive platform for sharing experiences – no IXP association – only sub-regional initiatives
THE GAP

- Local hosting and local content industry underdeveloped – little interest in regional peering – ISPs reverting to cashing to save on expensive international transit

- IP transit prices higher than the global market (driven by highly priced local infrastructure) – price erosion trends slower than elsewhere

- Many incumbents consider peering a threat to transit business

- Legal environment governing the digital economy in the region still to mature – causing slower move by international content players towards the region

- Cross-border policies and regulations require regional harmonization

- Political will still to be translated into concrete actions to eliminate barriers and create an enabling environment
# CHALLENGES OF THE REGULATORY ENVIRONMENT

- International connectivity and cross-border interconnection key drivers for regional peering

<table>
<thead>
<tr>
<th>Access policies to submarine cable infrastructure not conducive</th>
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<tbody>
<tr>
<td>- Limited competition in terrestrial cross-border fiber provision</td>
</tr>
<tr>
<td>- Exclusive rights to incumbents or regulatory barriers to entry</td>
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<table>
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<tr>
<th>Licensing for international connectivity combined with fixed/mobile licenses</th>
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<tr>
<td>- Coverage obligation / large investments inhibit focused business models</td>
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</table>

- Limitations on effective use of regional infrastructure
- High cross-border / international connectivity charges
- Limitations on cross-border network expansions and regional/international growth of IXPs

- High interconnection costs at landing stations
CHALLENGES OF THE REGULATORY ENVIRONMENT

Lack of regional harmonization of the regulatory landscape
- Serving the region from a single PoP complicated
- Less incentives for International carriers to invest in regional PoPs

Licensing obligations required for peering at IXP
- Content heavy networks remain absent

→ More difficult to develop hub cities for regional traffic exchange
→ IXP critical growth factors (membership/traffic) limited
A REGIONAL ROADMAP IS NEEDED

- Regional harmonization for an enabling environment

  - Lift regulatory restrictions for IXP operation and peering
  - Review policies limiting cross-border interconnection between neighbouring Arab countries
  - Review costs of cross-connect and associated regulatory fees
  - Increase competition for terrestrial cross-border connectivity
  - Harmonize legal, policy & regulatory frameworks between Arab countries
A REGIONAL ROADMAP IS NEEDED

- Developing a vibrant content industry

- Review legal frameworks are digitally relevant and conducive to online content industry development

- Ensure data-rich and content-heavy platforms are entitled to peer

- Ensure policies do not hinder flow of Internet traffic between Arab countries

- Study and address security & data protection concerns leading to data localization

- Support interconnection of Arab NRENs, regional ecommerce and pan-Arab Internet trade
A REGIONAL ROADMAP IS NEEDED

- Community buildup and the creation of a knowledge platform
- Gather community support
- Regional platform for open exchange of ideas
- Exchange programs and skills development
- Establish measurement tools
- Expand partnerships to NOGs and IXPAs
IMPORTANT TO CONSIDER

- Advancing a regional agenda is a joint responsibility & requires collaborative work among stakeholders
- Roadmap should combine political will of governments with proper business case by operators to address gap
- No silver-bullet or one-model-fits-all
- IP peering cannot be grown through regulatory enforcement – rather regulatory incentives are needed
- We need to learn lessons from other regions
- IXP ecosystem is only one building block – holistic approach needed as gains can be limited by other bottlenecks across the value chain
- Periodic review of regional peering and stock-taking of implemented policies needed
ALWAYS REMEMBER

Developing IXPs and regional peering is not an objective in itself … It should serve the wider objective of developing the Internet economy to improve regional integration and economic development in the Arab region.