

## First TAB meeting

EULER Technical Advisory Board Meeting  
iMinds, Ghent, Belgium  
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- **Specialties.** Future Internet architectures and business ecosystems, self-management and control, autonomic and cognitive networking, complex networks, Industrial Mathematics

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- **Specialties.** Next Generation IP-based Network, integration of technologies and evolution towards IPv6.

The first Technical Advisory Board (TAB) meeting of the EULER project was organized on June 8, 2012 at Ghent University. The goals of this first meeting were i) to present the EULER project motivations, objectives and orientations in terms of Internet routing and ii) to initiate a first reality check with the operational community. In order to steer discussions, a set of specific questions were submitted in advance to TAB meeting participants in order for them to prepare their answers and gather more detailed feedback following an introductory presentation by the project.

### Questionnaire to TAB

We need to organize the session with the AB members. The discussion will be initiated with a pool of questions for AB members to allow for deeper or more structured answers during the debate.

Pool of questions:

- Which distributed routing functionality are essential (adaptivity, traffic-engineering, policing, multicast, etc.)?
- Would you trade functionality against performance, e.g., reduce the number of routing entries but in turn limit the traffic-engineering options/decisions ?
- Do you foresee extension of the routing system beyond Tier 3 ?
- Do you consider policing/traffic-engineering as provided by BGP fulfilling all your routing policy/traffic-engineering needs ?
- What would be the minimum improvement in terms of performance (assuming identical functionality) that would be required to justify a routing protocol replacement ? Would a replacement of current locator value space acceptable in these conditions ?
- We have multiple performance metrics: size of routing tables, stretch, convergence time, cost of signaling, stability, etc. What are acceptable trade-offs from industrial side? operational side ?
- Are hybrid routing schemes acceptable, for instance a greedy routing scheme in which paths exceeding a given stretch are re-computed using different schemes ?
- Is it better to minimize maximum routing table size or the overall sum (per domain/AS) ?
- Concerning routing protocol deployability conditions, it would be interesting to know what they are waiting for in practice to be convinced that a given routing scheme deserve to fight for and to be deployed even if the deployment plan is a 10 year schedule.
- Would you trade functionality/performances against built-in measurement capabilities?
- Do you notice/foresee an increase/need of measurement-based decision making?
- Do you think that operators may provide more access to information on their infrastructure? In exchange of more information on infrastructure of others?
- What incentives for putting in common / making public information on operators choices, policies, networks, etc?

The discussions for what concerns the distributed routing functionality that are essential include in order of priority: adaptivity, policing, and security that BGP offers today (if we would include security considerations as developed in SIDR IETF Working Group). Incentives for migration to a new routing model/protocol shall be justified by at least one order of magnitude of performance improvement (e.g. memory size) without deteriorating other functionality and/or performance currently provided by BGP. This statement corroborates the current position taken in the EULER project. Indeed, core/edge routers today can accommodate  $O(1M)$  IPv4 active routes (in Loc\_RIB), which seems to leave sufficient headroom at current deployment rate.

Moreover, if the replacing routing model/protocol would induce the use of a different current locator space (compared to the current IPv4 space) deep operational impact would follow. This should be further justified in terms of reduction of operational complexity and cost (beside the cost of migration). Such migration would be justified when the new routing protocol offers new "business opportunities" and not only improves the cost of scale/performance of the Internet routing system.

Though invited participants see high value and relevance in long-term routing research, they remain convinced that the triggers for changing the Internet routing protocol would be mainly "problem-driven" and not exclusively driven by improvements of protocol performance aspects. For this purpose, the following activities seem to be of main interest for the participants:

- investigation of the IPv6 routing table growth (compared to IPv4) and impact on routing system,
- stability of the routing system/routing paths,
- heterogeneity of the environments where BGP can be deployed and executed (assuming extension in data centers for instance)
- more specific BGP policing operational such as in/out filter (re-)configuration upon node failure.