

LEDBAT architecture framework consisting of pluggable components

draft-mayutan-ledbat-congestionarchitecture-00.txt

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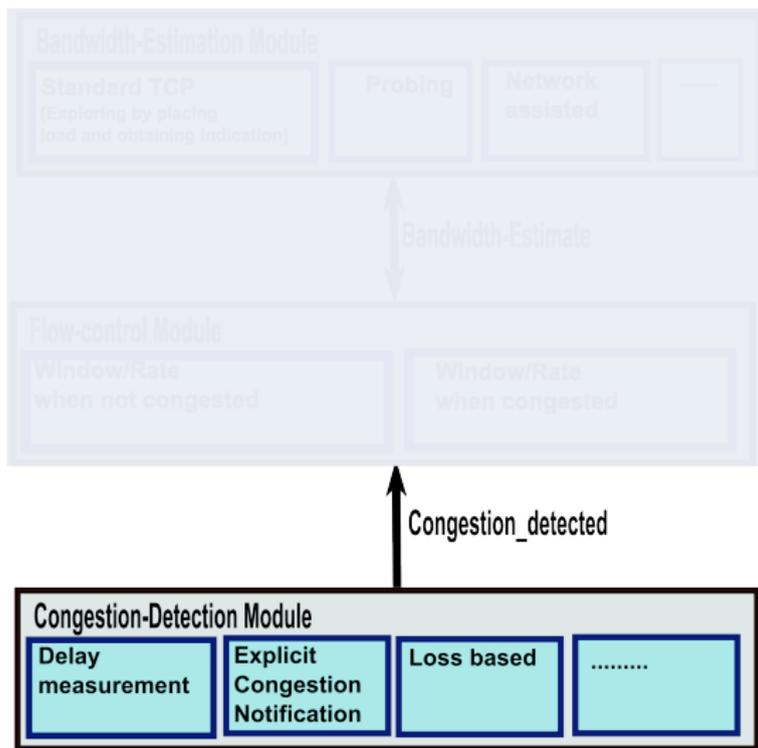


Figure: Architecture consisting of pluggable components

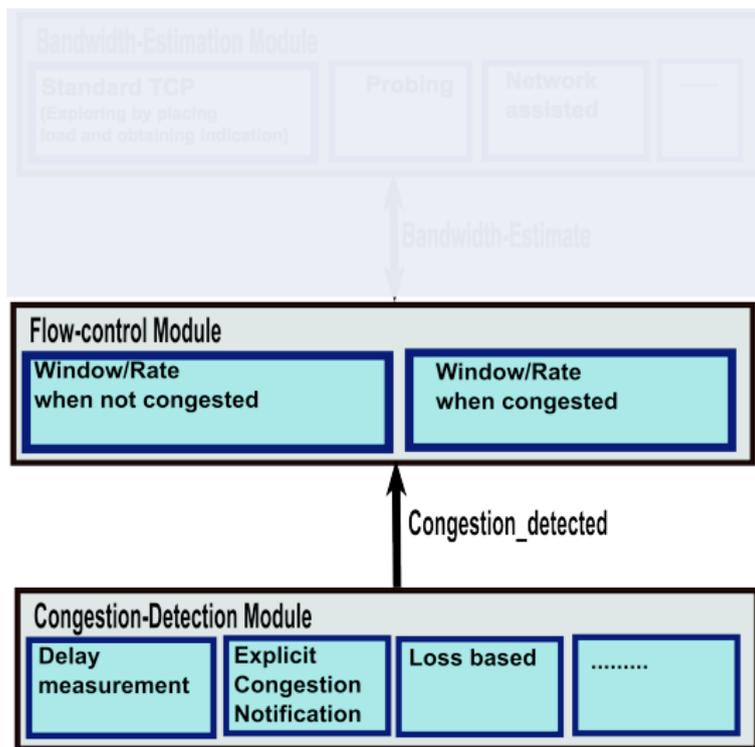


Figure: Architecture consisting of pluggable components

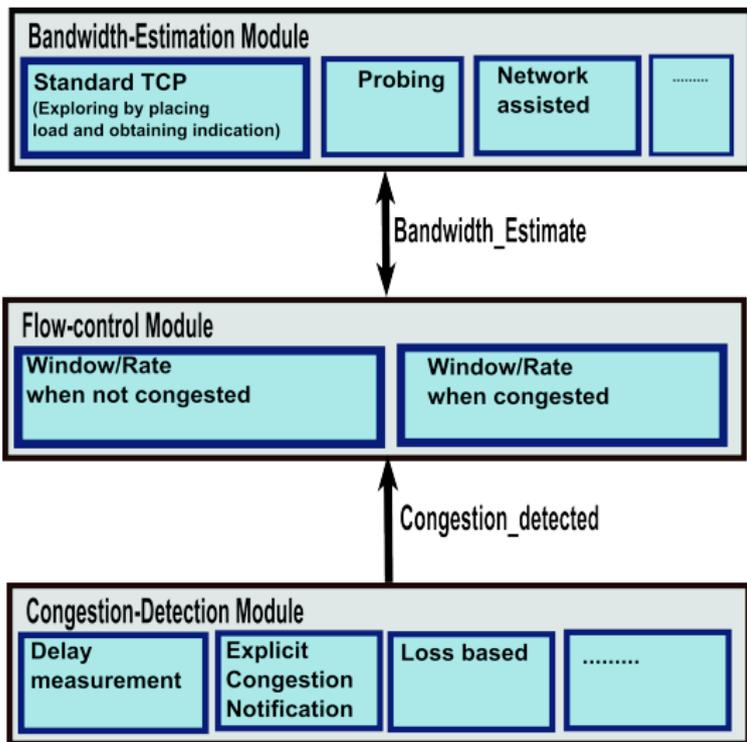


Figure: Architecture consisting of pluggable components

=> Each module operates in a different timescale

Congestion Detection Module

- Delay Based
 - + Does not require network support
 - – Sensitive to variation in routes, bottleneck buffer size, bursty traffic etc.
- Loss based
 - + Reliable indicator of congestion
 - – Results in substantial interference to TCP
- ECN marking based
 - + Good and early indicator of the onset of congestion
 - – Requires network support
- Delay + Loss/marketing based

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Congestion indicator:

- Binary states: congested or non-congested
- Multiple levels: 0, 0.1, .., 0.5, .., 1

Flow Control Module

- Standard TCP (AIMD)
 - + Robust: Good indication of available capacity
 - – Substantial queuing, thereby delay
 - – Conservative in using available bandwidth
- Variants (Aggressive Increase)
- + Good for high BDP networks
 - Without bandwidth estimation
 - – Cause interference: No prior knowledge of available bandwidth
 - With Bandwidth Estimation
 - + Separates congestion control from bandwidth estimation
 - – Slower
 - – Involves additional overhead

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⇒ Always necessary to have an estimate of available bandwidth

Bandwidth Estimation Module

- Standard TCP (increase until loss)
- Delay based (e.g Vegas, Compound TCP)
- Probing based
- Router assisted (e.g. Quick start)
- Support of some oracle server

An example

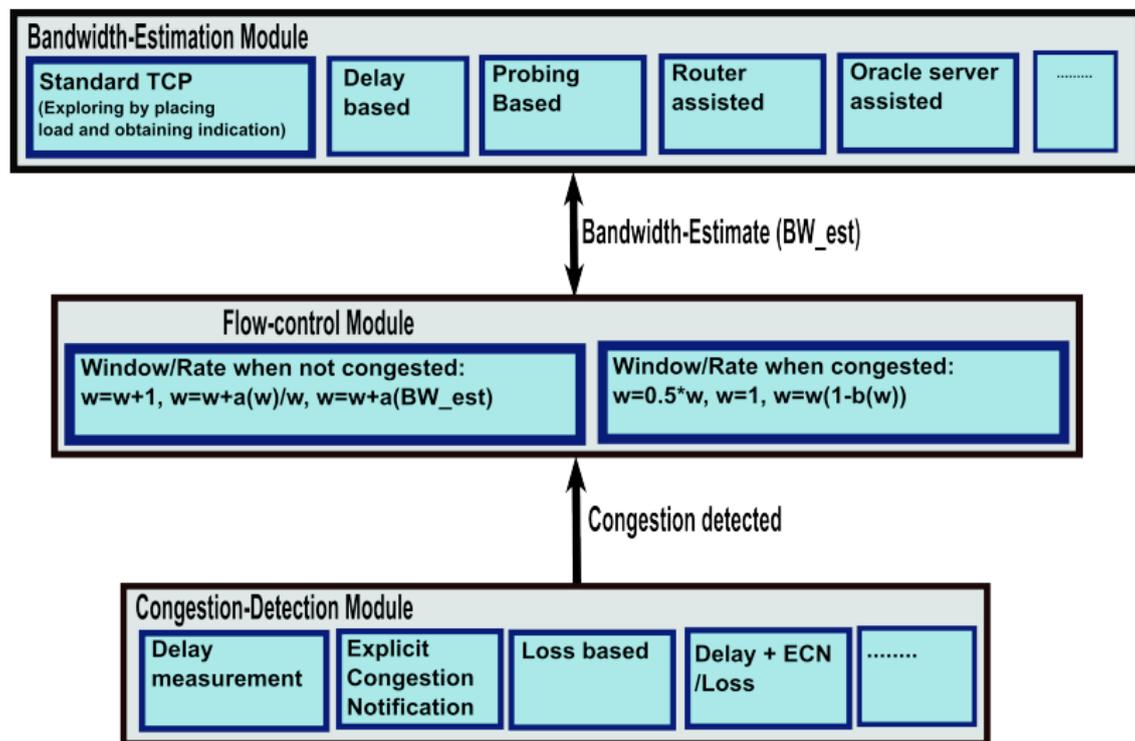


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Conclusion

- We could use it as a guideline while standardizing a CC mechanism to keep it flexible.
- Each module and component can be independently standardized
 - Decoupling each module
- Often implicitly followed in current specifications