



AutoAlerts – From Data to Actions and Insights at Conviva

Conviva

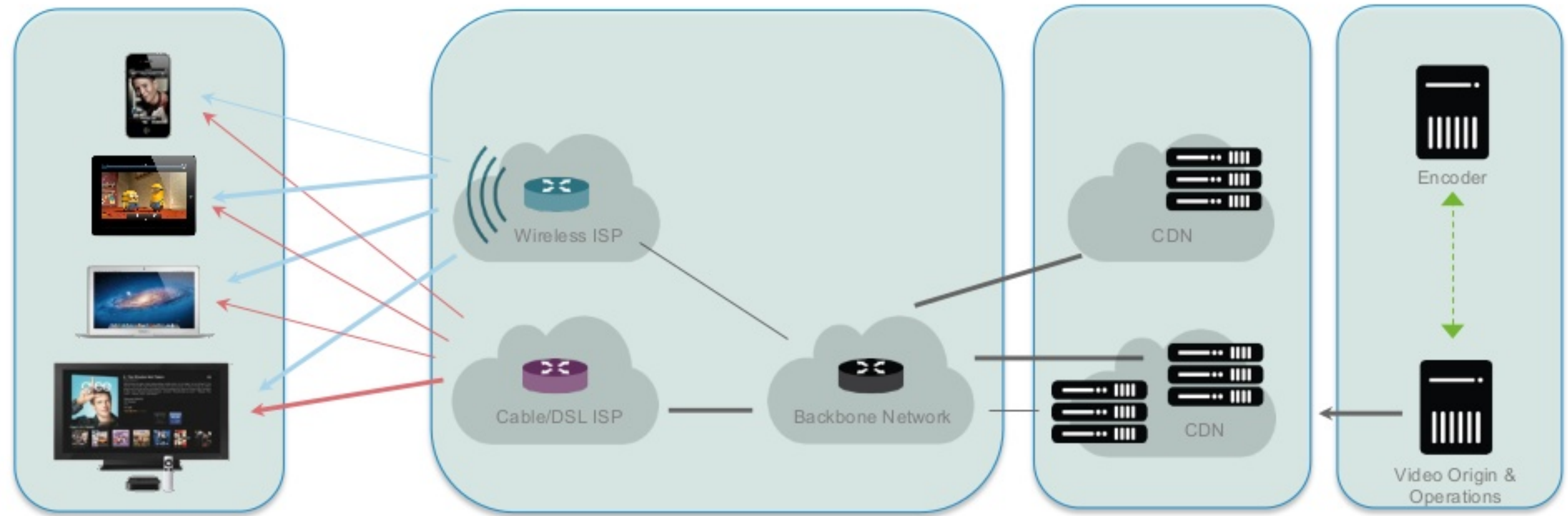
- Data platform for Internet video streaming
 - Monitor quality of viewing experience
 - Optimize quality of viewing experience
 - Maximize viewer engagement

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- Video streaming over the internet (OTT) is growing rapidly
 - Major industry shifts in the last couple of years
 - HBO Now
 - ESPN/SlingTV
 - Verizon Go90
 - Facebook, Twitter
 - Amazon Prime Video

Online Video – A Hugely Important Application
“Big Bang” Moment is Unfolding – Right Now

Internet Video Streaming is Hard

Many parties, many paths but no E2E owner



Devices & OVPs

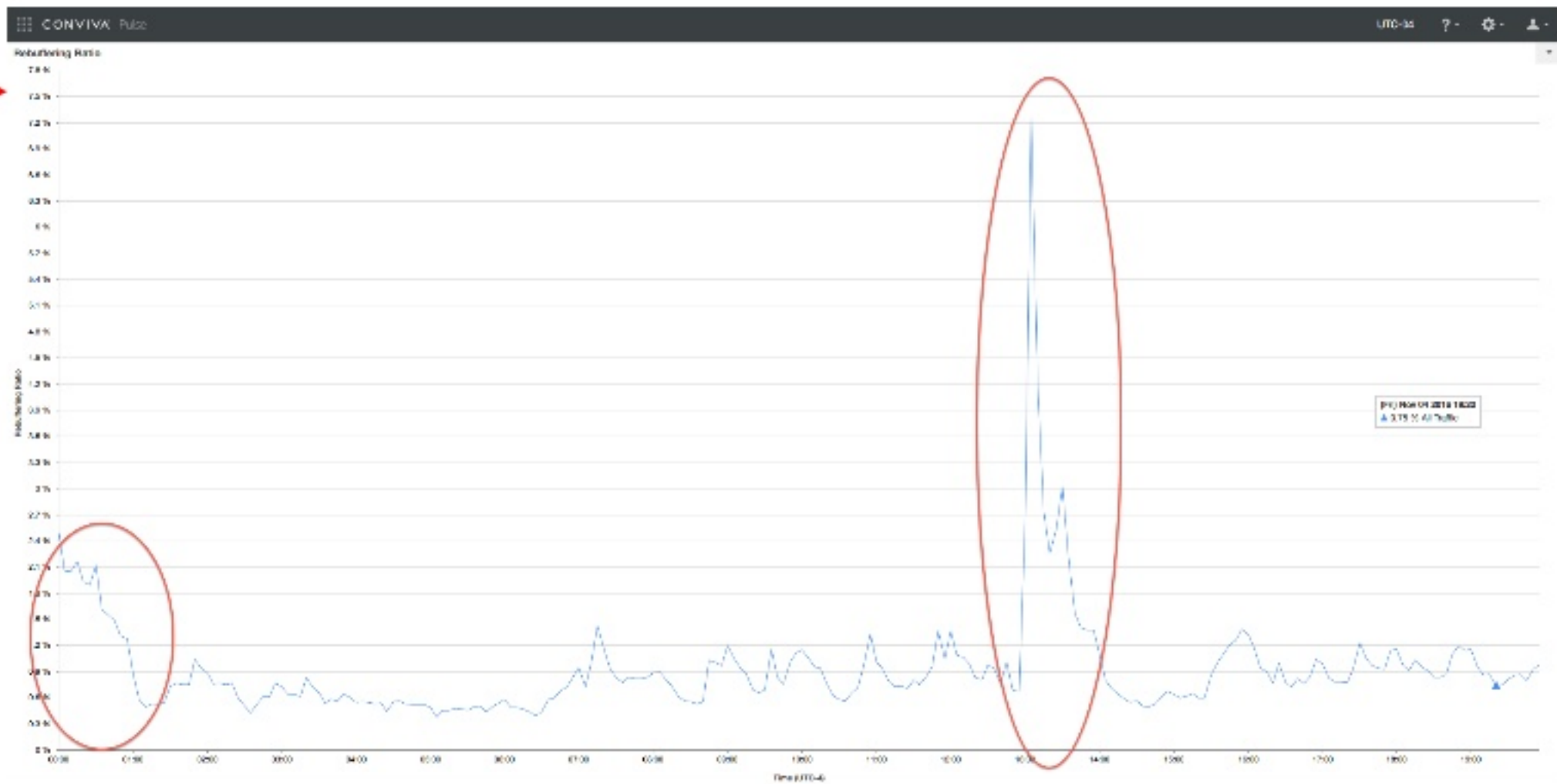
ISPs and Networks

CDNs

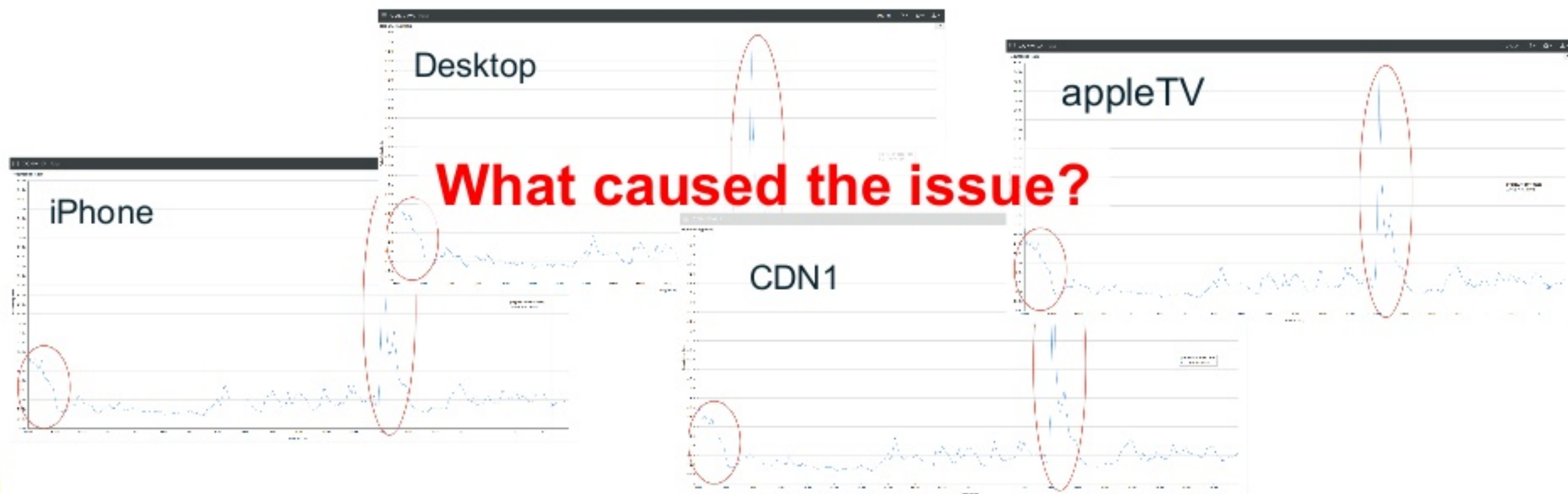
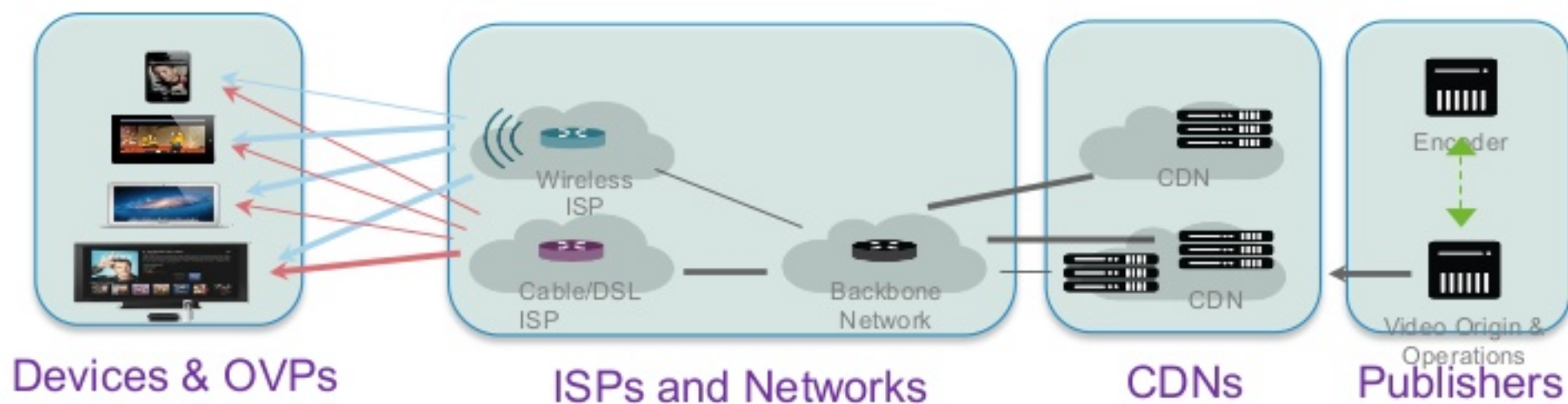
Publishers

Any entity can fail any time → degradation of QoE

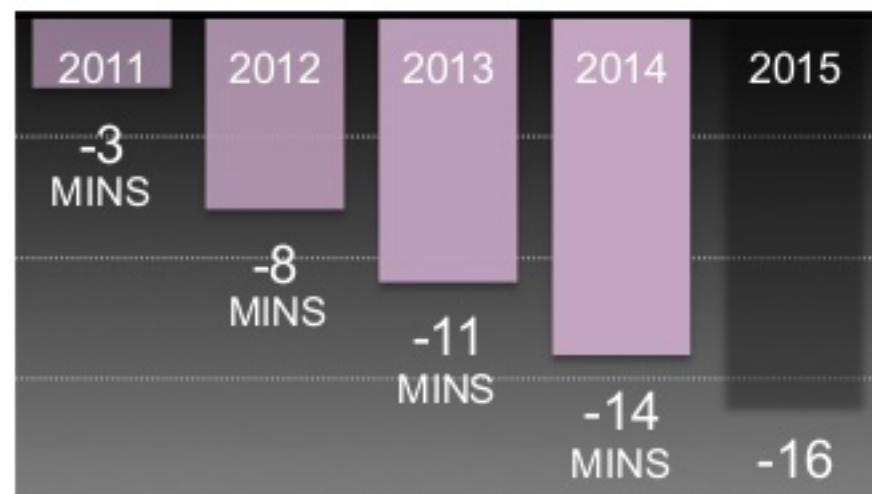
Buffering Ratio on iPhone



Devices & OVPs



QoE Is Critical To Engagement



HOW LIKELY ARE YOU TO WATCH
FROM THAT SAME PROVIDER AGAIN?



58.4%
CHURN RISK

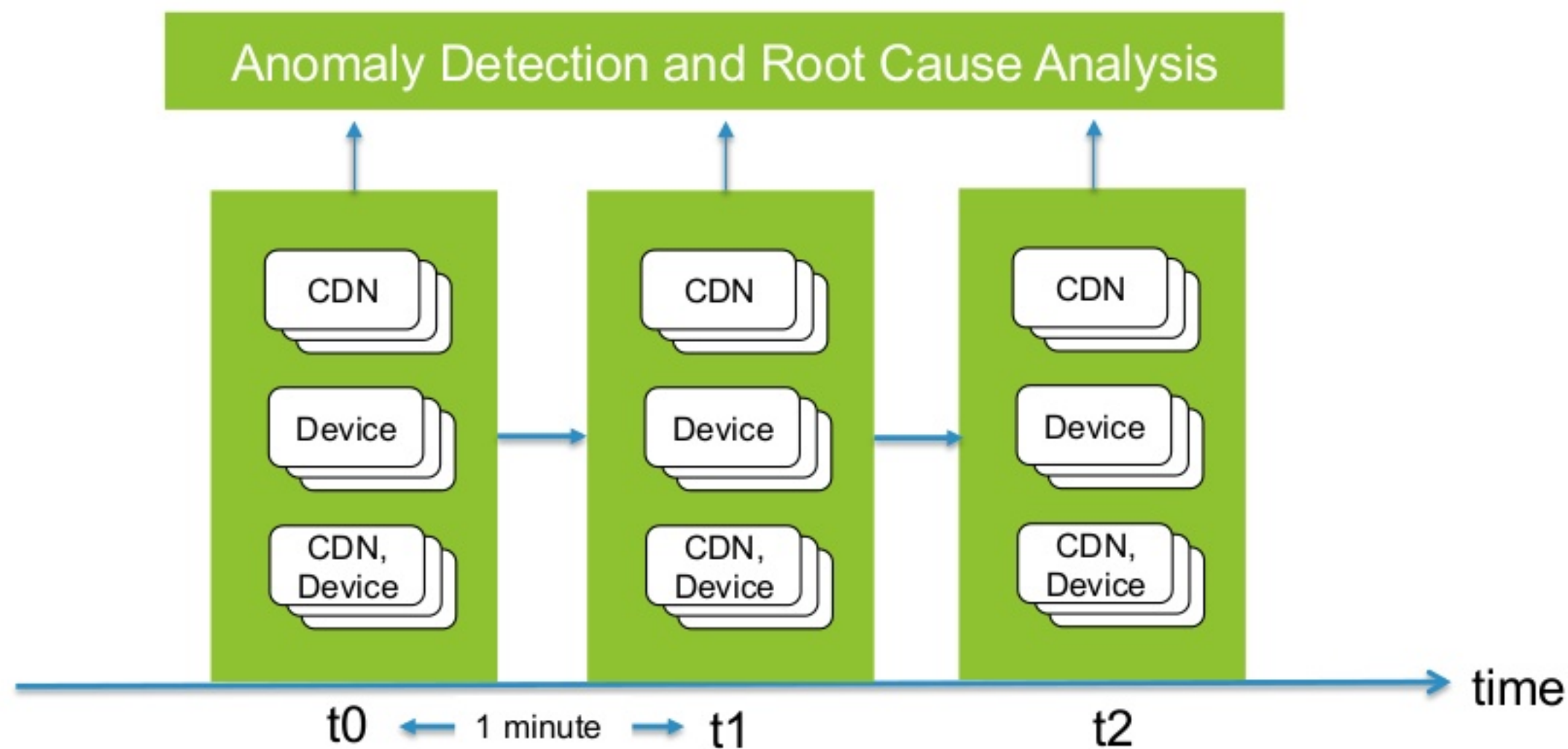
Source: Conviva, "2015 Consumer Survey Report"

What We Need

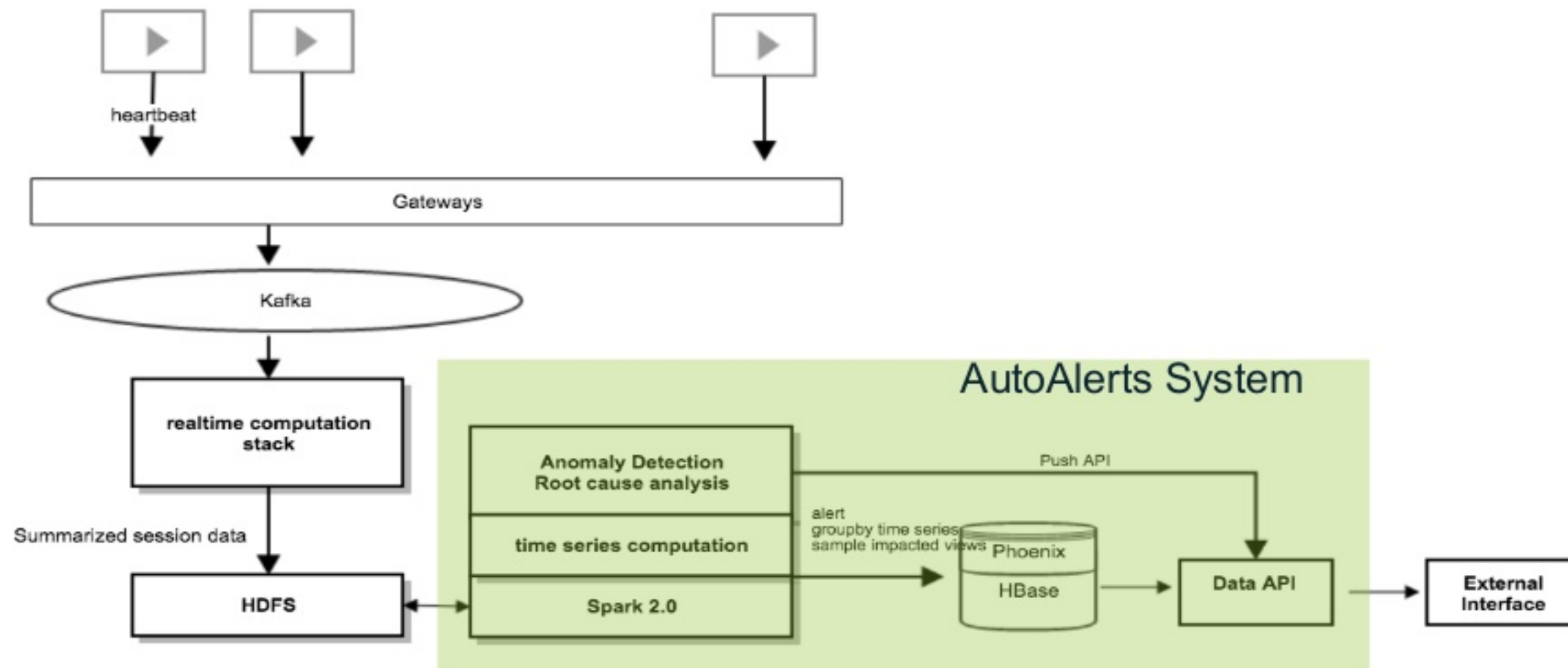
- A system that can, **in near real-time**
 - Detect quality issues in viewing experience
 - Diagnose the root cause among many entities along the content delivery pipeline
 - Provide rich supporting data to help troubleshooting
 - Sample impacted views with rich metadata
 - Time series of aggregated metrics

Our Solution – Conviva Auto Diagnostics Alerts

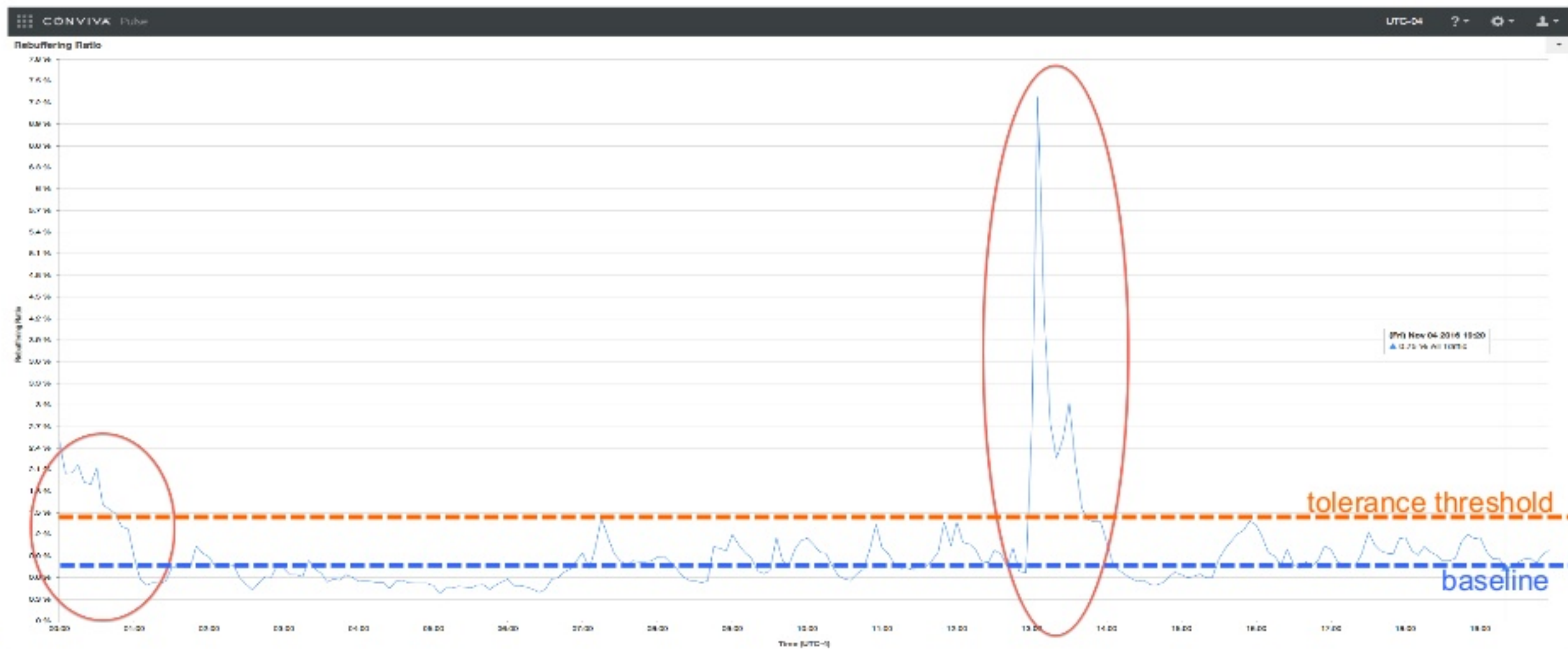
Under The Hood



Under The Hood

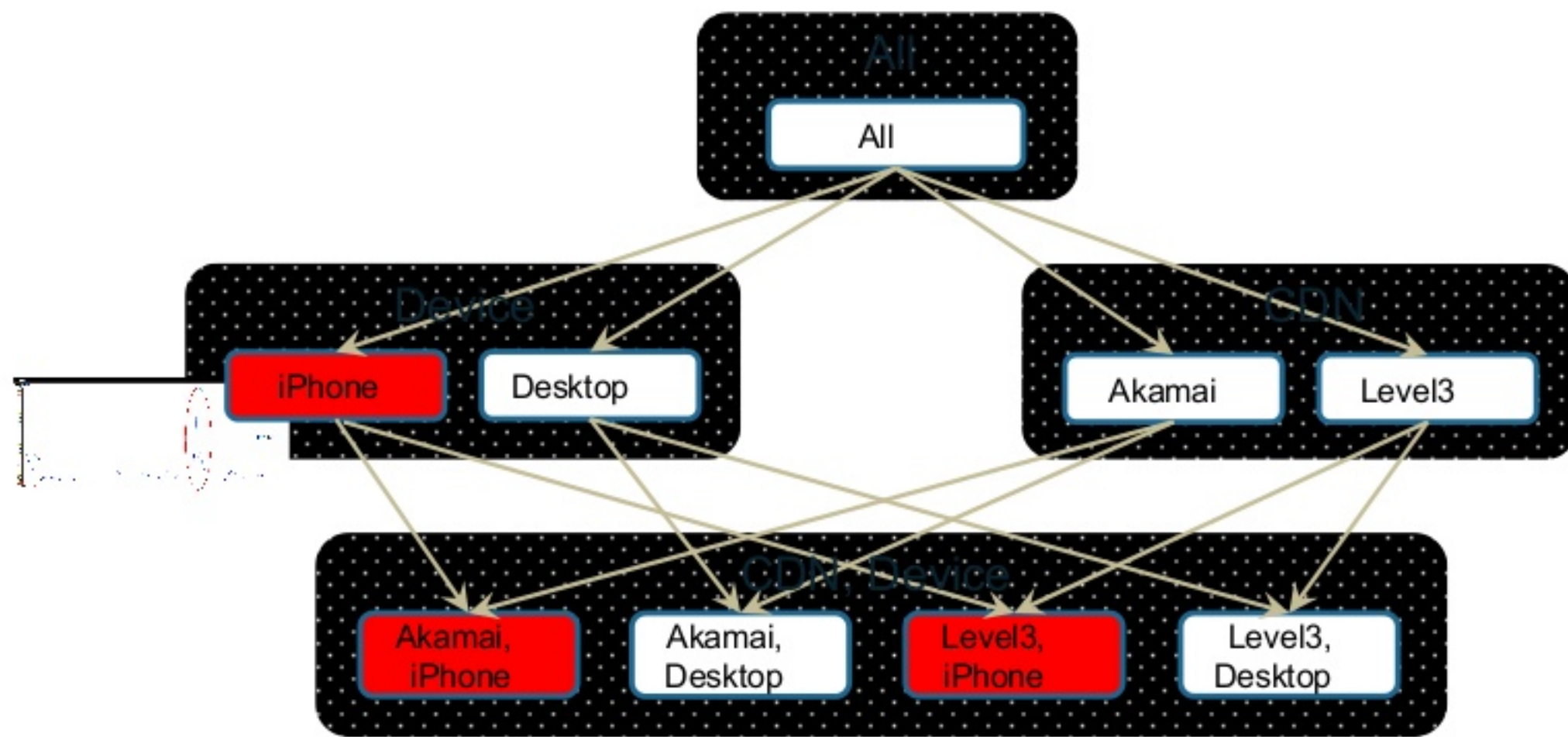


Detection Algorithm



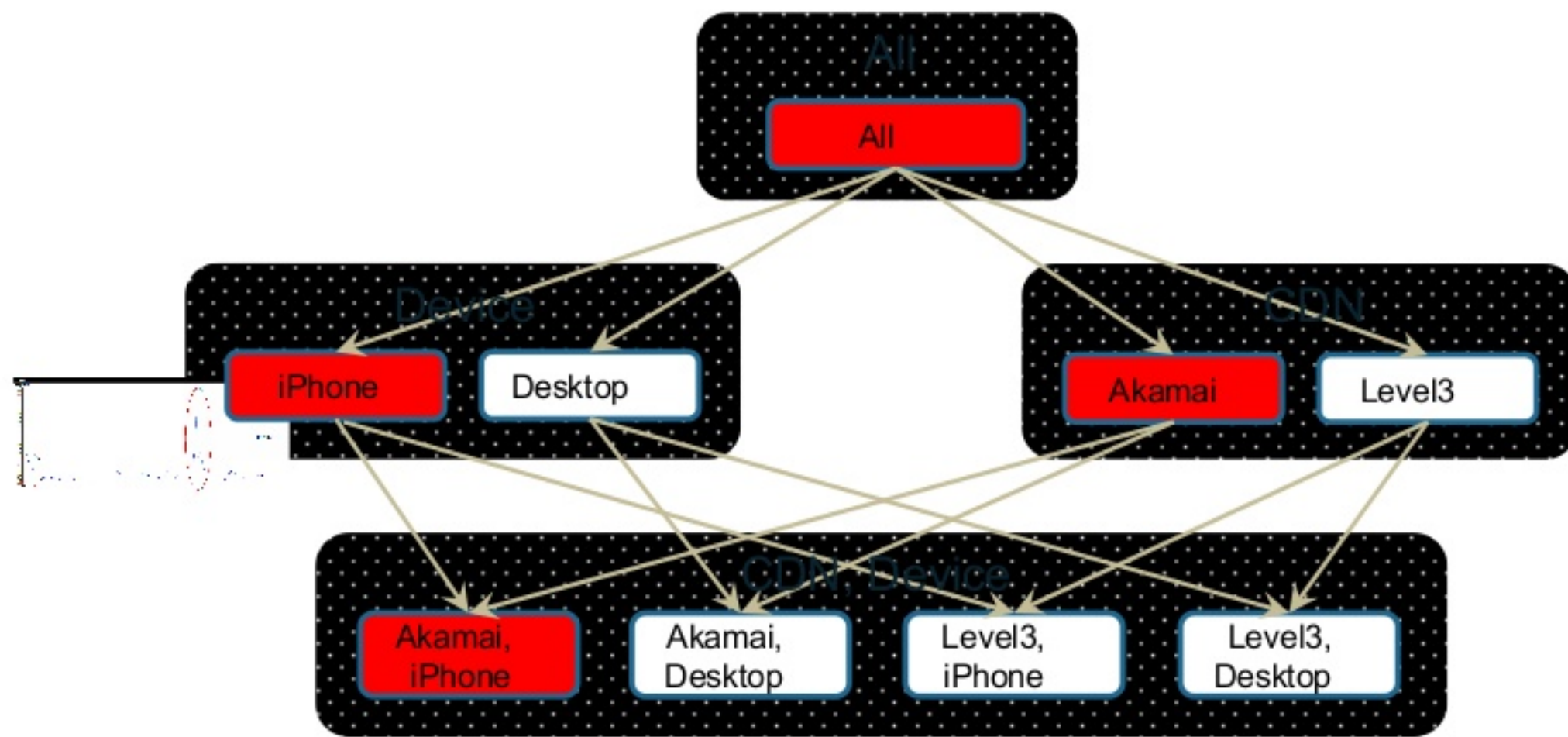
Diagnosis Algorithm

Blame group whose subgroups are all bad



Diagnosis Algorithm

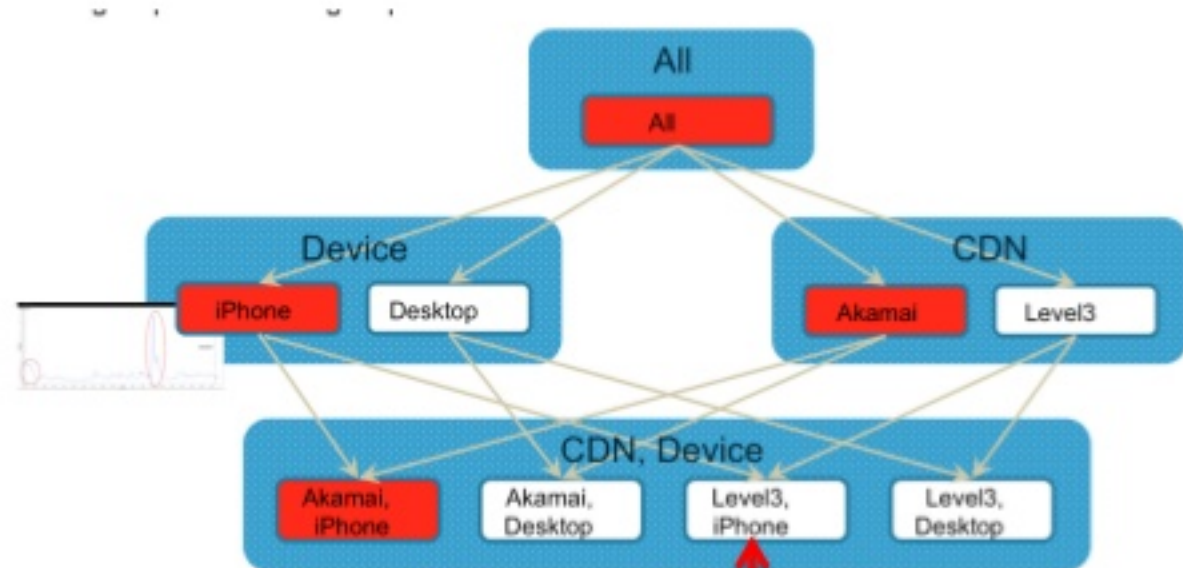
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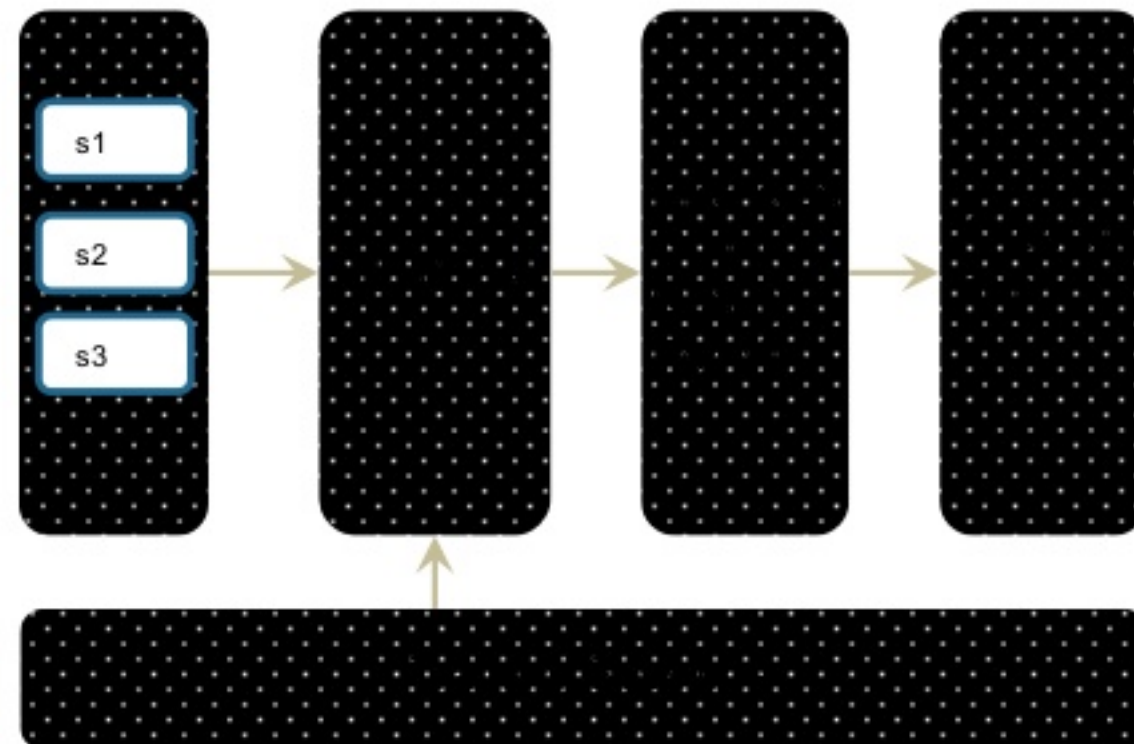
Diagnosis Algorithm

Problem: small groups may not have enough traffic to detect issue reliably

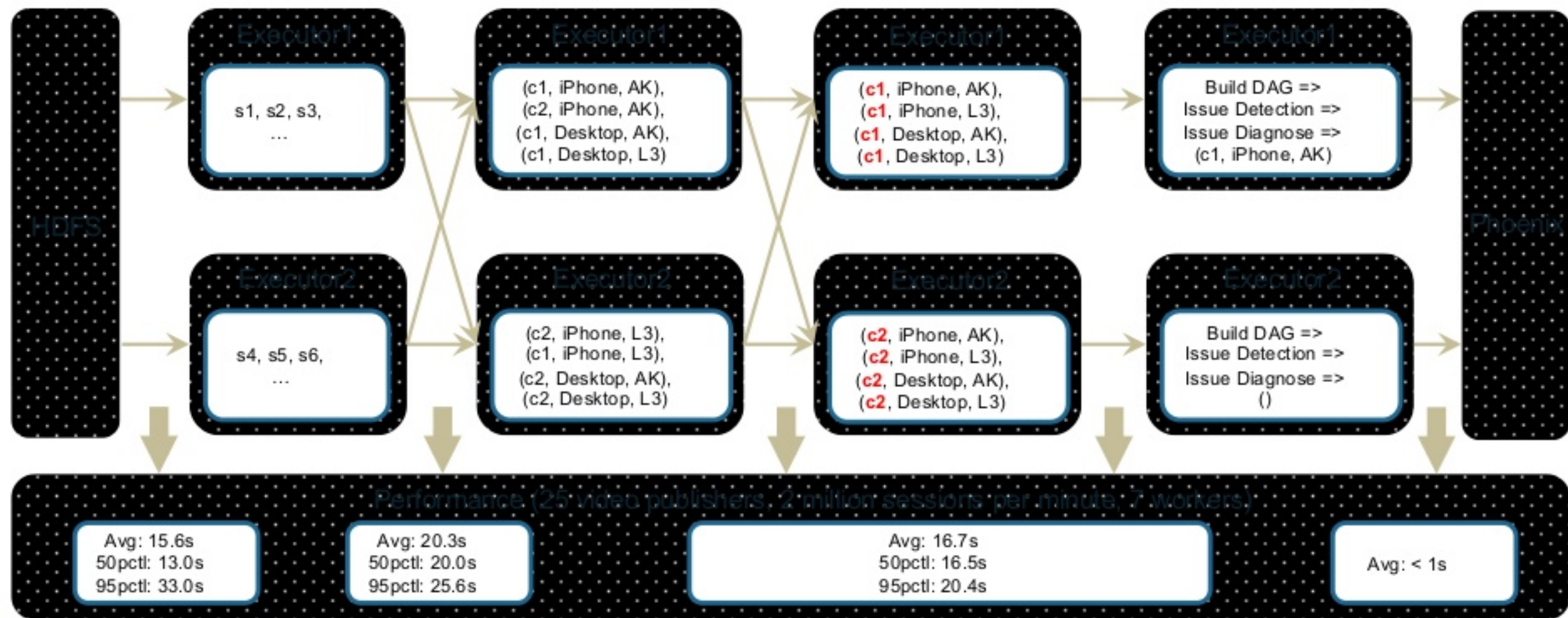
Solution: ML helps estimate the average performance (per min) for such small groups



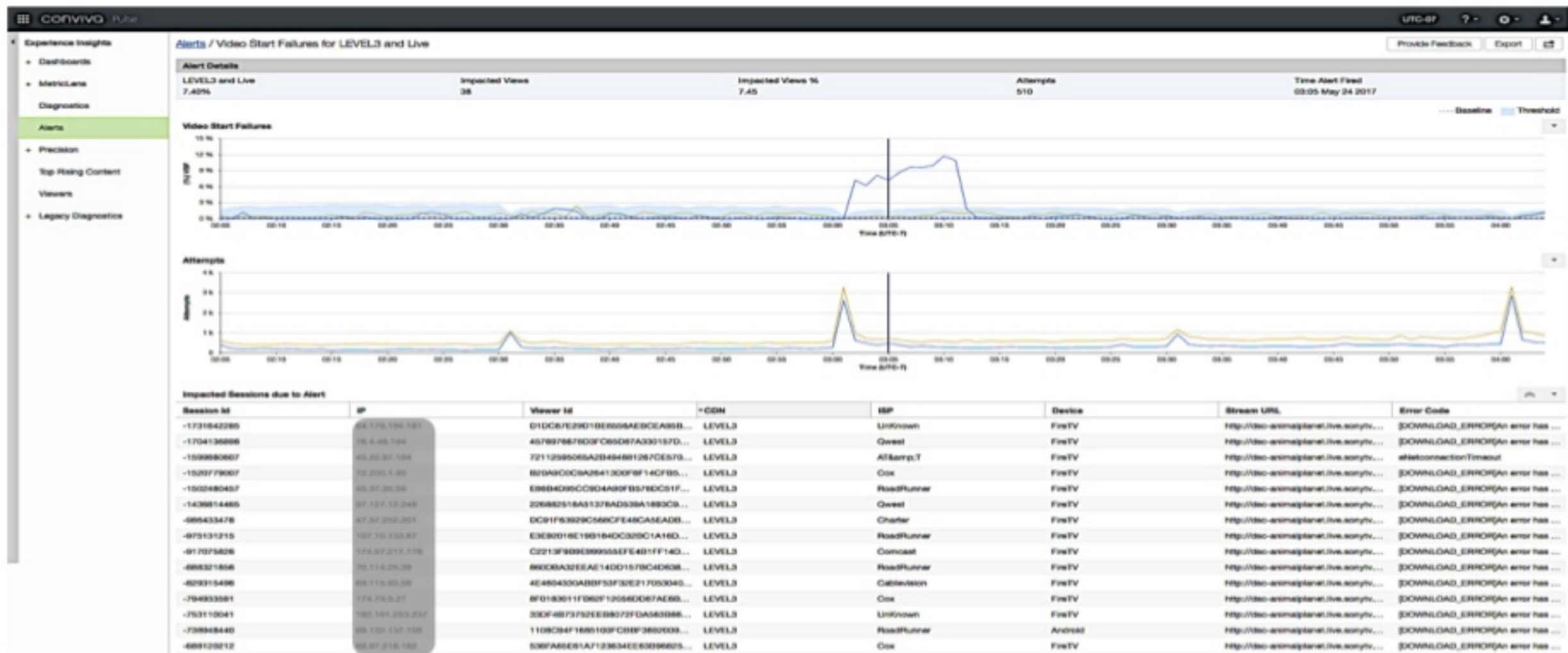
Too small, anomaly or not?



Algorithm Distributed



Real Example - CDN Failure



Wrap-up

- Already resolved actual publishing issues in real time
- Very positive feedback from customers
- Currently supporting
 - 25 video publishers
 - 2 million sessions per minute
 - Multiple quality metrics: start failures, start time, buffering
- Future work
 - Systematic evaluation of detection and diagnosis accuracy
 - Other detection and diagnosis algorithms
 - System performance tuning to improve scalability and latency

We Are Hiring

<http://www.conviva.com/our-team/careers/>



Thank You

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Attachment - Detection Algorithm

- Observations: quality metrics oscillates around a stable baseline over time
- Do the following computation per minute
 - Compute the mean per metric per group using sessions within a big sliding window as the baseline
 - Compute a tolerance threshold under which the metrics are considered normal
 - Mark the group as "bad" if the metric at the current minute exceeds the tolerance threshold by certain level

Attachment - Diagnosis Algorithm

- Insight: among all bad groups, root cause group should be the one whose children are all bad
- Steps:
 - BFS traverse, starting from “all traffic” group
 - If a group is marked as “bad”, start a DFS traverse.
 - If multiple/all (tunable) children are bad, blame parent as root cause
 - If one child is bad, recursively drill down
 - Union all root causes and return