RMCAT
Application Interaction

draft-zanaty-rmcat-app-interaction-01

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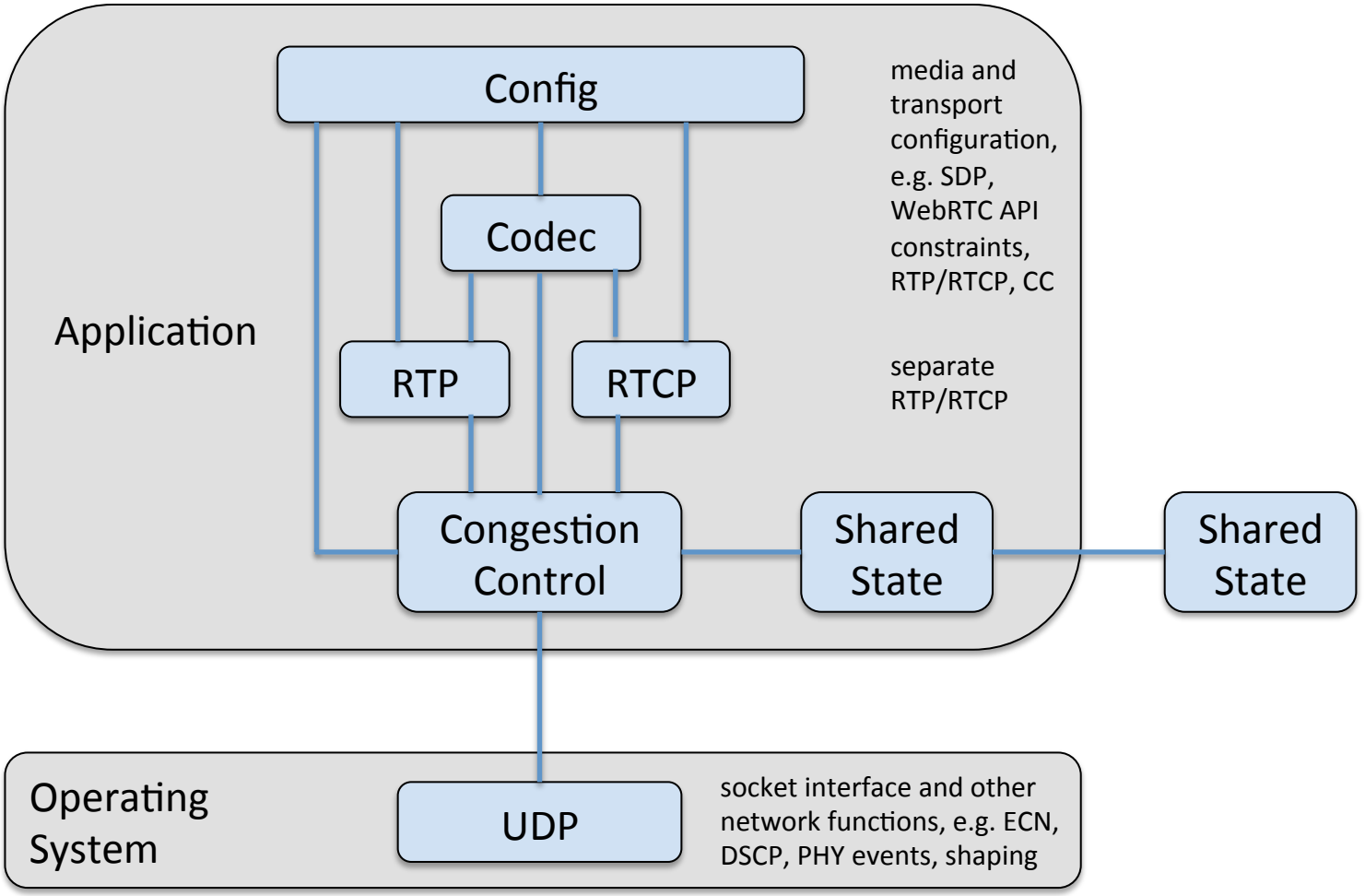
Goals

- Agree on the conceptual decomposition of RMCAT applications to describe interfaces and interactions between congestion control and other functions
- Agree on the interfaces and interactions
- Consider if useful for normalizing evaluations of solution candidates

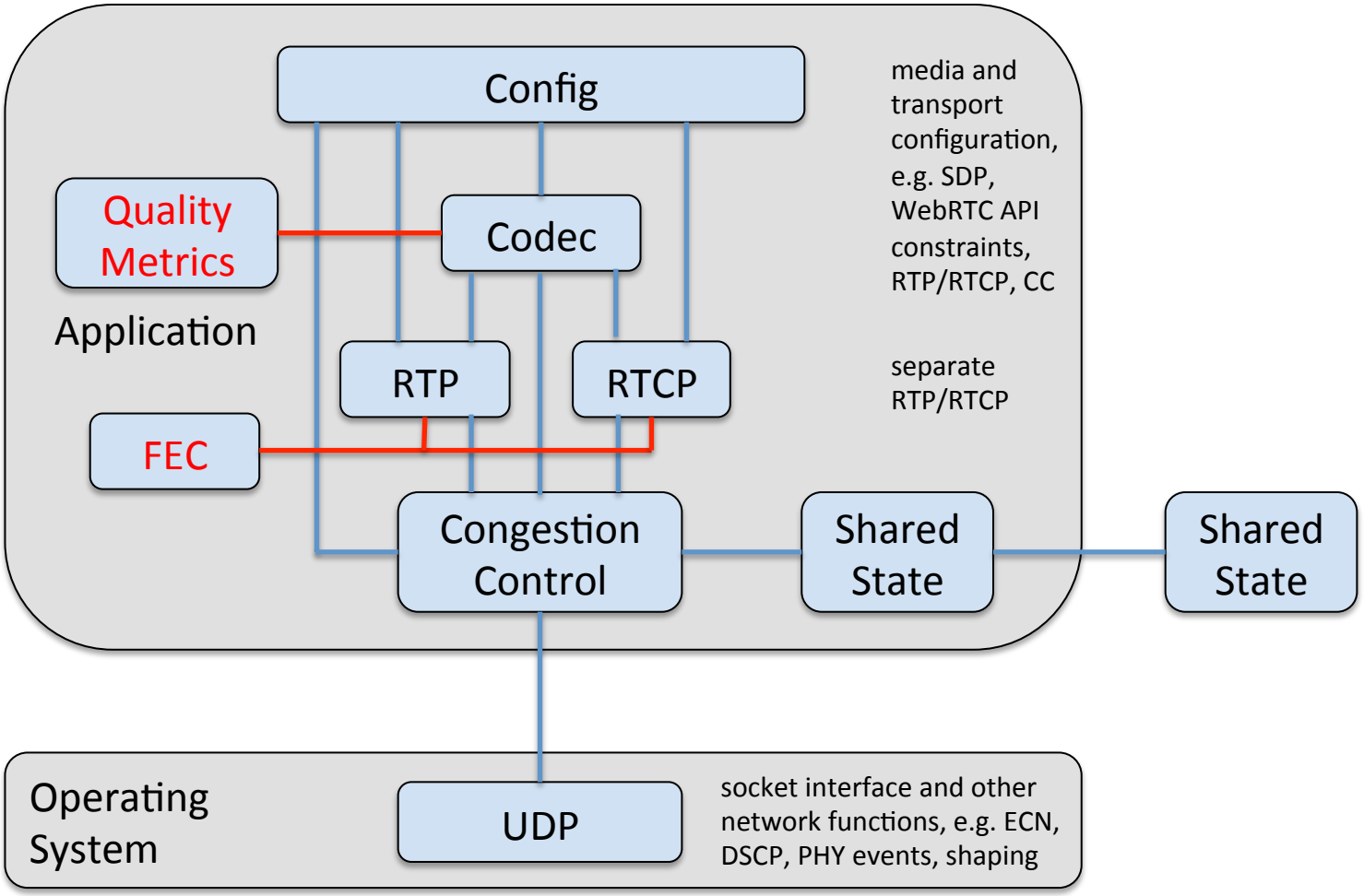
Changes since -00

- Conceptual decomposition changes:
  - Configuration applies to almost every component
  - Separate RTP and RTCP
  - Consider decomposition of Congestion Controller internal interfaces
- New interfaces and interactions
  - Configuration of RTP, RTCP and Congestion Control
  - RTCP interfaces to Codec and Congestion Control
- Consider if useful for normalizing evalutations of solution candidates

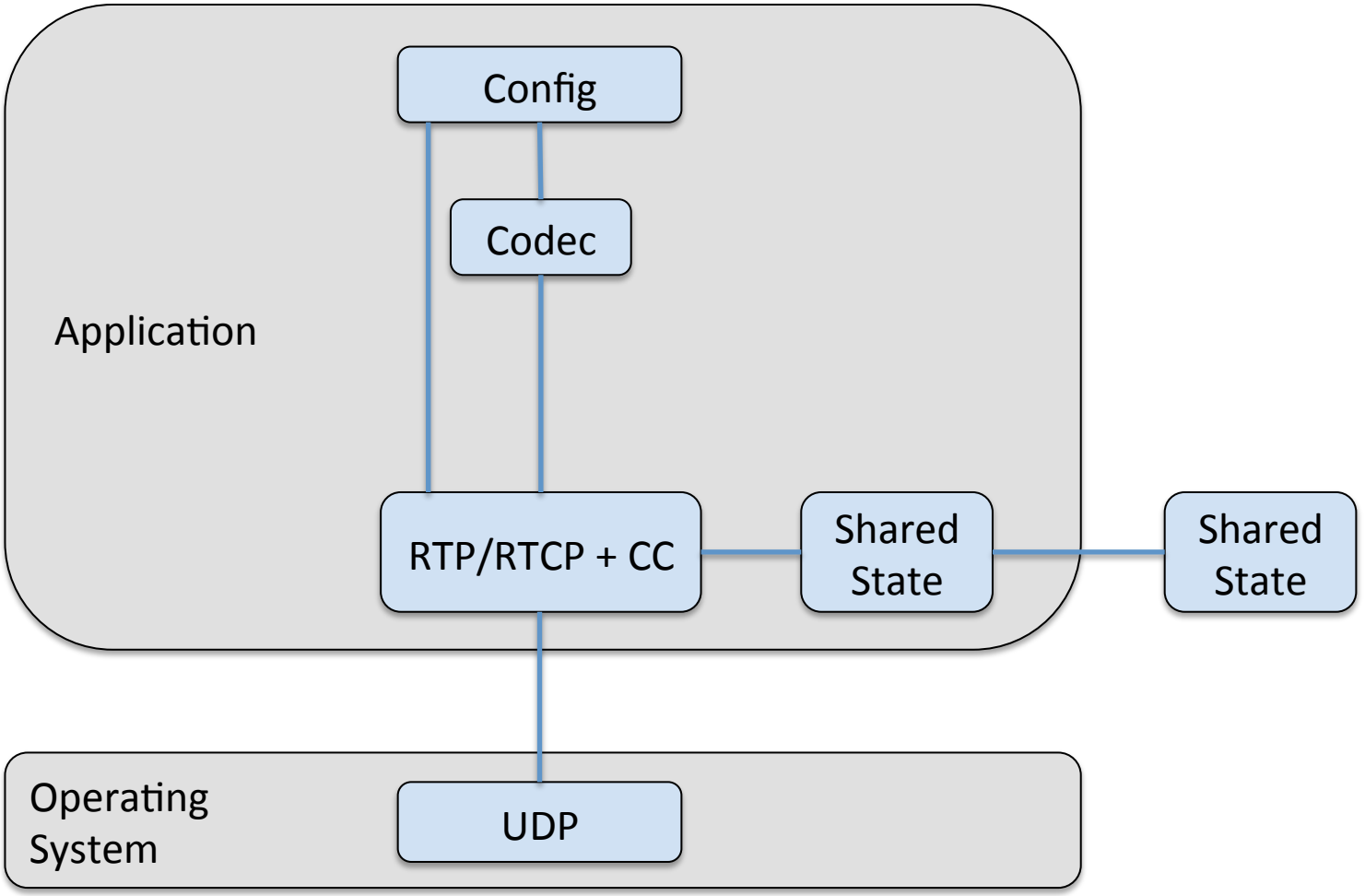
Conceptual Model



Conceptual Model Additions?



Implementation Model



Interfaces and Interactions

- Config – Codec / RTP / RTCP / CC
- Codec – RTP / RTCP
- Codec – Congestion Control
- RTP – Congestion Control
- Congestion Control – UDP
- Congestion Control – Shared State

Config – Codec/RTP/RTCP/CC Interactions

- Max bit rate, resolution, frame rate, etc.
- Multiplexed media streams (BUNDLE)
- Multiplexed RTP and RTCP (RFC 5761)
- RTCP attributes negotiated
  - Reduced size (RFC 5506)
  - Codec control messages (RFC 5104)
  - Transmission time offsets (RFC 5450)

Codec – RTP/RTCP Interactions

- Packetization of codec frames into RTP packets
- Some network interfaces may benefit from small packet sizes well below the MTU
- Some benefit from large packets near the MTU
- Equalizing packet sizes of a frame may also be beneficial in some cases, rather than a combination of large and small packets
- FEC bandwidth overhead may depend on the largest source packet size, so equalizing the source packet sizes can yield lower overhead than a combination of large and small packets

Codec – CC Interactions

- **Allowed Rate (CC to Codec) – critical interface**
- Media Elasticity (Codec to CC)
- Startup Ramp (Codec to CC, and CC to Codec)
- Delay Tolerance (Codec to CC)
- Loss Tolerance (Codec to CC)
- Throughput Sensitivity (Codec to CC)
- Rate Stability (Codec to CC)
- Forward Error Correction (FEC)
- Probing for Available Bandwidth

RTP/RTCP – CC Interactions

- RTP circuit breakers must never trip
- RTCP feedback conveys CC info
- RTP header extensions in bidirectional flows may also convey CC info
- RTP header extensions may also convey transmission time offsets when they differ from the nominal sampling time intervals

CC – UDP Interactions

- Pacing / shaping of transmitted packets
  - Adaptively enabled based on congestion state
  - CC may shape a single flow or multiple flows
  - OS may shape all or selective traffic
- Detect transport capabilities
  - OS shaper
  - ECN
  - DSCP
  - AQM
- PMTUD / PLPMTUD?

CC – Shared State Interactions

- To be discussed in draft-welzl-rmcat-coupled-cc
- Weighted Fairness
  - Multi-flow CC may need application-specified weights.
  - Within an application, it is likely the different flows have different rate requirements, so equal bandwidth sharing may not be fair nor desirable, and weighted fairness may be required.
  - Across applications, or even across hosts, the weights become more difficult to define.

Next Steps

- Agree on components and interactions?
- Are we covering the goals of the milestone?