Hardware Requirements

- System Requirements - RTMP Server
- System Requirements - Transcoding Server
- System Requirements - Load Baance Server

System Requirements - RTMP Server

Below is a rough guideline for server hardware requirements for your RTMP server

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For 10 Concurrent Streams

- **CPU:**
  • **2 cores** (modern dual-core at ~2.5+ GHz should be sufficient)
- **RAM:**
  • **4 GB minimum** (8 GB recommended for extra buffering and system overhead)
- **Network:**
  • **1 Gbps NIC**
  - *Estimated Bandwidth:* ~40 Mbps total (10 streams × 4 Mbps)
  - Plenty of headroom is available with a 1 Gbps link

For 100 Concurrent Streams

- **CPU:**
  • **4–8 cores**
  - For ingest only, a quad-core 3.0+ GHz processor may suffice
  - If any processing (e.g., repackaging) is added, lean toward 8 cores
- **RAM:**
  • **8 GB minimum** (16 GB recommended to comfortably handle buffering, connection management, and OS overhead)
- **Network:**
  • **1 Gbps NIC might be borderline** if streams are high quality
  - *Estimated Bandwidth:* ~400 Mbps total (100 streams × 4 Mbps)
  - For extra reliability and headroom, consider a **10 Gbps NIC** or NIC bonding

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For 1,000 Concurrent Streams

- **CPU:**
  • **8–16 cores**
  - For pure ingest, 8 cores might work if optimized
  - If you perform any transcoding or heavy processing, 16+ cores are recommended
- **RAM:**
  • **16 GB minimum** (32 GB recommended to accommodate higher buffering, connection management, and any additional processing tasks)
- **Network:**
  • **10 Gbps NIC (or aggregated/multiple NICs)**
  - *Estimated Bandwidth:* ~4 Gbps total (1,000 streams × 4 Mbps)
  - A 10 Gbps connection provides the necessary headroom and stability

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Key Considerations

- **Processing Load:**
  The above recommendations assume minimal CPU load per stream (i.e. simple ingress).
- **Network Overhead:**
  Real-world conditions (protocol overhead, burstiness, etc.) might push bandwidth requirements higher. It's wise to over-dimension network capacity relative to the calculated total.
- **Scalability:**
  In production, consider load balancing across multiple servers if you expect to consistently approach these limits, and ensure monitoring to adjust resources as needed.

These guidelines provide a starting point to help you size your hardware. Actual requirements can vary significantly depending on your exact situation.

System Requirements - Transcoding Server

Below is a rough guideline for server hardware requirements for a transcoding server

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For 10 Concurrent Streams

- **CPU:**
  - **6–8 cores**
    - This gives headroom to run roughly 20 concurrent encoding tasks (2 per stream) plus manage the passthrough.
- **RAM:**
  - **8 GB minimum** (16 GB recommended)
    - Ensures smooth operation with multiple encoder processes and OS overhead.
- **Network:**
  - **1 Gbps NIC**
    - *Estimated Ingress:* 10 × 4 Mbps ≈ 40 Mbps
    - *Estimated Egress:* 10 × (1.5 + 2.5 + 4) ≈ 80 Mbps
    - The 1 Gbps link easily covers this with room for spikes.

For 100 Concurrent Streams

- **CPU:**
  - **16–32 cores**
    - Each stream produces 2 CPU-intensive transcoding jobs; a larger core count is critical. The higher range is advised for pure software encoding.
- **RAM:**
  - **16 GB minimum** (32 GB recommended)
    - More concurrent encoding tasks will benefit from extra memory.
- **Network:**
  - **10 Gbps NIC (or aggregated connections)**
    - *Estimated Ingress:* 100 × 4 Mbps ≈ 400 Mbps
    - *Estimated Egress:* 100 × ~8 Mbps ≈ 800 Mbps
    - Although calculated bitrates are below 1 Gbps, using a 10 Gbps NIC provides ample headroom for overhead, bursty traffic, and potential increases in bitrate if you

choose higher-quality settings.

Additional Considerations

- **Hardware Acceleration:**
  If you can use GPUs or dedicated encoding hardware (NVENC aka NVIDIA), you can significantly reduce CPU requirements. For large-scale transcoding, this is often a more cost-effective and energy-efficient approach.
- **Scalability:**
  For very high concurrency (hundreds to thousands of streams), consider a multi-server or cloud-based transcoding farm that distributes the load rather than relying on a single box.
- **Encoding Settings & Quality:**
  More aggressive encoding quality settings will increase CPU load. Tailor these recommendations based on your specific quality versus resource trade-offs.
- **Redundancy & Future Growth:**
  Always plan with extra headroom for unexpected spikes and future scaling needs.

These guidelines provide a starting point to help you size your hardware. Actual requirements can vary significantly depending on your exact situation.

System Requirements - Load Baance Server

Below is a rough guideline for server hardware requirements for a load balance server

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Assumptions:

- **Stream Bitrate:** We'll assume each "complete" stream (all ABR renditions combined) averages about 8 Mbps (e.g. 480p at ~1.5 Mbps, 720p at ~2.5 Mbps, plus 1080p at ~4 Mbps).
- **Connection Handling:** The load balancer maintains TCP/HTTP connections for streaming protocols (or even raw RTMP, if used) and may perform SSL/TLS termination.
- **Overhead:** Always allow extra headroom for protocol overhead, bursty traffic, and connection management.

For 10 Concurrent Egress Streams

- **CPU:**
  • **2 cores**
  - For basic packet forwarding and connection handling (even with SSL termination), a modern dual-core CPU should suffice.
- **RAM:**
  • **4 GB minimum** (8 GB recommended)
  - To handle OS buffers, connection tracking, and any light processing.
- **Network:**
  • **1 Gbps NIC**
  - *Estimated Egress Throughput:* 10 × 8 Mbps ≈ 80 Mbps
  - A 1 Gbps link provides ample headroom.

For 100 Concurrent Egress Streams

- **CPU:**
  • **4–8 cores**
  - More cores help manage a higher number of concurrent connections, especially if SSL termination or deeper packet inspection is involved.

- **RAM:**
  - **8 GB minimum** (16 GB recommended)
    - Additional memory is useful for a larger connection table and buffering.
- **Network:**
  - **1 Gbps NIC might be borderline**
    - *Estimated Egress Throughput:* 100 × 8 Mbps ≈ 800 Mbps
    - **Recommendation:** Use a **10 Gbps NIC** or dual 1 Gbps NICs (bonded) to comfortably handle bursts and protocol overhead.

For 1,000 Concurrent Egress Streams

> **Important:**
> Handling 1,000 concurrent streams (totaling around 8 Gbps egress) is a high-demand scenario. Often, a single load balancer at this scale is implemented as part of a distributed architecture with clustering or specialized hardware.

- **CPU:**
  - **16–32 cores**
    - A high core count is needed to manage thousands of simultaneous connections and potential SSL termination or other processing tasks.
- **RAM:**
  - **16 GB minimum** (32 GB recommended)
    - To efficiently manage a large connection table and OS/network buffers.
- **Network:**
  - **High-throughput NIC(s):**
    - *Estimated Egress Throughput:* 1,000 × 8 Mbps ≈ 8 Gbps
    - **Recommendation:** At least a **10 Gbps NIC**, though depending on burstiness and protocol overhead, you might consider aggregated NICs or a **40 Gbps solution** to ensure stability.

Additional Considerations

- **Distributed Architecture:**
  For 1,000+ streams, consider deploying multiple load balancers behind a front-end DNS or hardware load balancing solution to spread the traffic and provide redundancy.
- **Monitoring & Scalability:**
  Always plan for some extra headroom to handle traffic spikes, and monitor your system closely to adjust resource allocation as needed.

These guidelines provide a starting point to help you size your hardware. Actual requirements can vary significantly depending on your exact situation.