Camera-to-VMS Ingest Cheat Sheet

The four steps a video stream takes from camera to recording — discovery, RTSP, transport, codecs — plus a connection-troubleshooting checklist.

Step	What happens	Standard & port	Watch out for
1 · Discover	The VMS finds the camera on the network, or you add it by IP / IP-range.	ONVIF WS-Discovery UDP 3702 / 239.255.255.250	Multicast is link-local — it will not cross a subnet or VLAN.
2 · Describe	RTSP DESCRIBE returns an SDP listing the streams and the codec of each.	RTSP (DESCRIBE) TCP 554	Record the main stream; show the low-res sub-stream on a live wall.
3 · Set up	RTSP SETUP agrees the transport and ports for the media, per stream.	RTSP (SETUP) TCP 554	UDP = lowest latency on a LAN; TCP interleaved across firewalls/NAT.
4 · Play	RTSP PLAY starts the RTP media + RTCP control; the VMS stores it as-is.	RTP / RTCP RFC 3550	The VMS does not re-compress — the camera's bitrate is what you store.

Transport decision (made at SETUP)

Clean, managed LAN -> RTP over UDP (lowest latency). Across a firewall, NAT, or the internet -> RTP interleaved over the one RTSP/TCP connection on port 554 (framing: $ + one-byte channel + two-byte length). TCP passes firewalls reliably; the cost is retransmission delay instead of a brief UDP glitch.

Codec & storage — the camera sets the bill

GB/day ~= Mbps x 10.8. One 4 MP camera at 30 fps, continuous: H.264 ~6 Mbps ~= 64.8 GB/camera/day; H.265 ~3 Mbps ~= 32.4 GB/camera/day. H.265 needs ~40-50% less bitrate for the same picture, so it roughly halves the disk -- and because the VMS stores the stream unchanged, that saving is set on the camera, before recording starts.

Troubleshooting the connection

Symptom	Likely cause and fix
Camera not discovered	It is probably on another subnet/VLAN; add it by IP address or range, and confirm UDP 3702 is not blocked.
Stream won't open over the internet/firewall	RTP is on UDP; switch the RTSP transport to TCP (interleaved) so it rides the one connection on port 554.
Storage fills faster than planned	Check the camera codec (prefer H.265) and the main-stream bitrate — the VMS stores exactly what the camera sends.
Live wall stutters / CPU spikes	You are decoding full-resolution main streams; switch the live view to the camera's sub-stream.
Found, but won't authenticate	Discovery is not access — set non-default credentials on the camera and enter them in the VMS.

Ports: WS-Discovery UDP 3702 - RTSP TCP 554. Standards: ONVIF Profile S/T, IETF RFC 2326/7826 (RTSP), RFC 3550 (RTP), ITU-T H.265 (HEVC).



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This sheet follows a stream from discovery through RTSP and transport to the codec that sets your storage bill. Our seven-volume handbook covers the rest of the stack; start with Volume 1 for H.264 and H.265 compression, then Volume 6 for analytics on those streams and Volume 7 for real-time pipelines.

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