

Figure 15.1 A distributed multimedia system

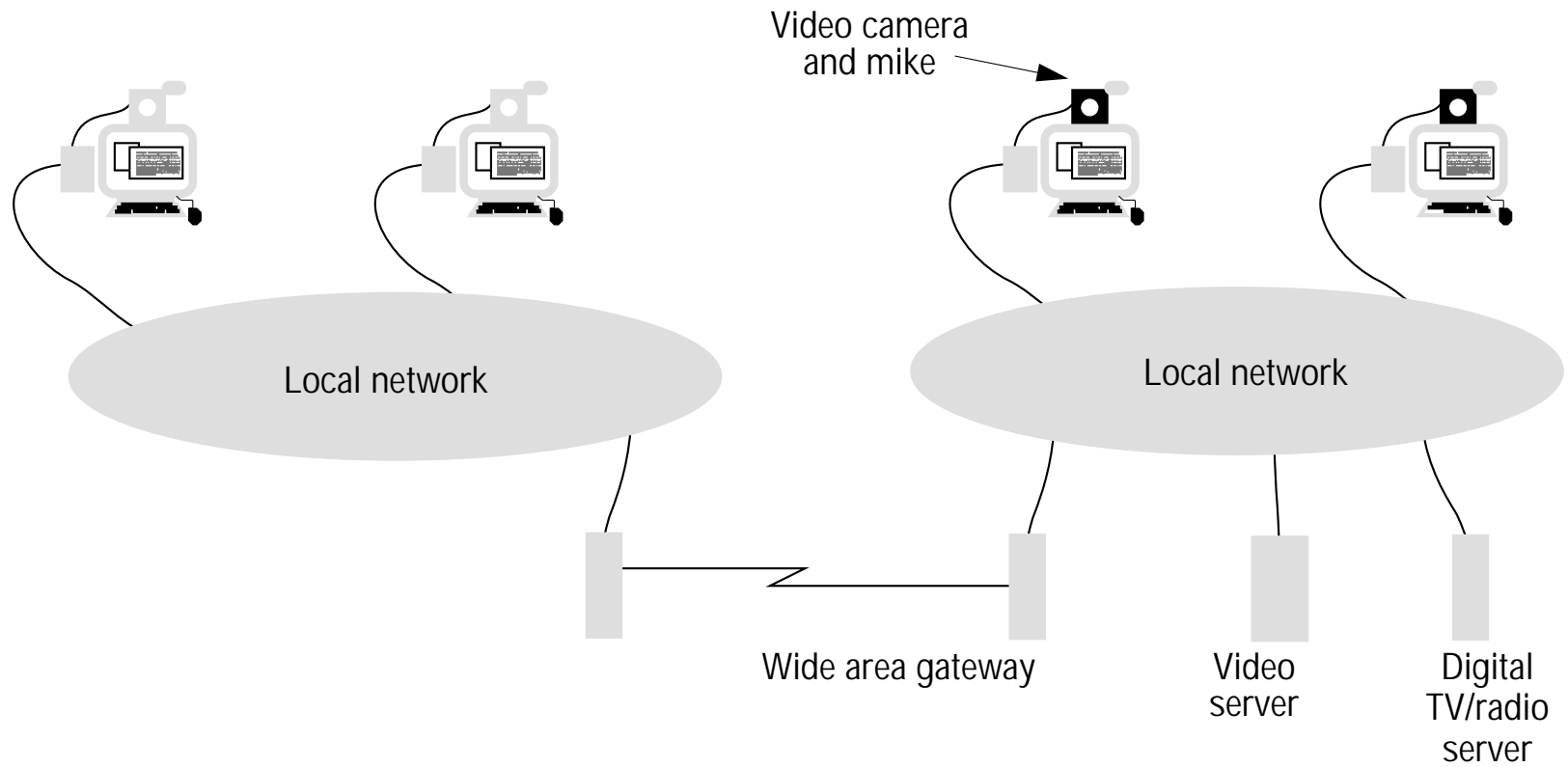


Figure 15.2 The window of scarcity for computing and communication resources

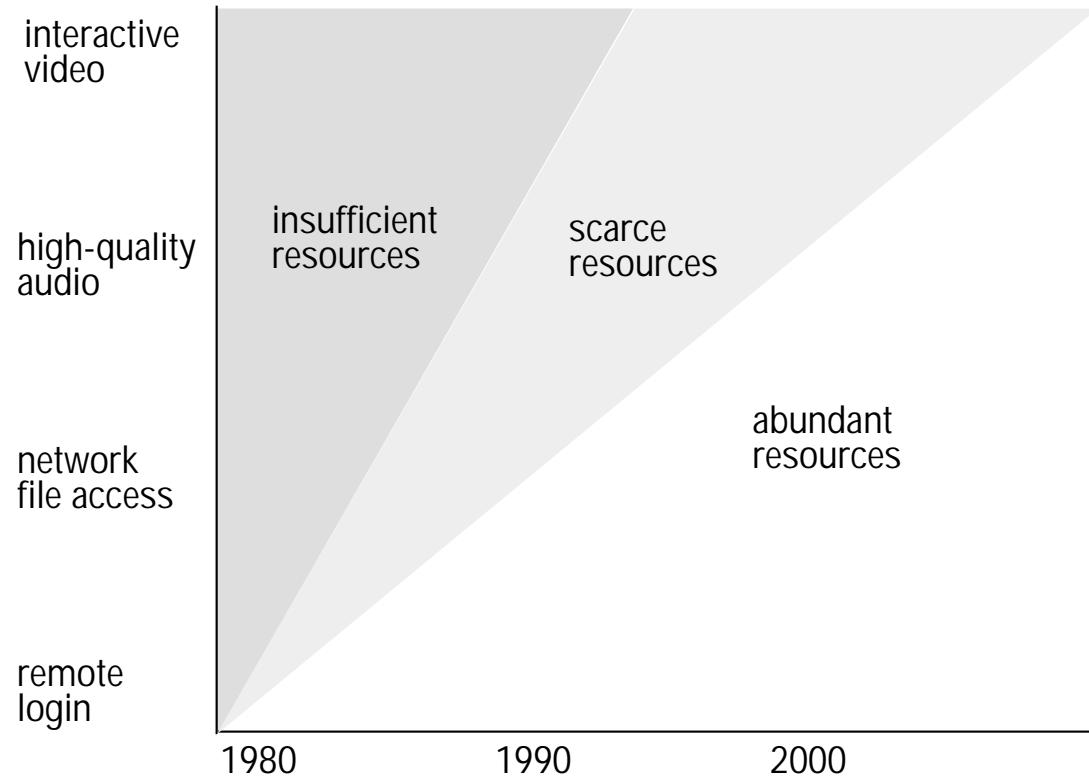
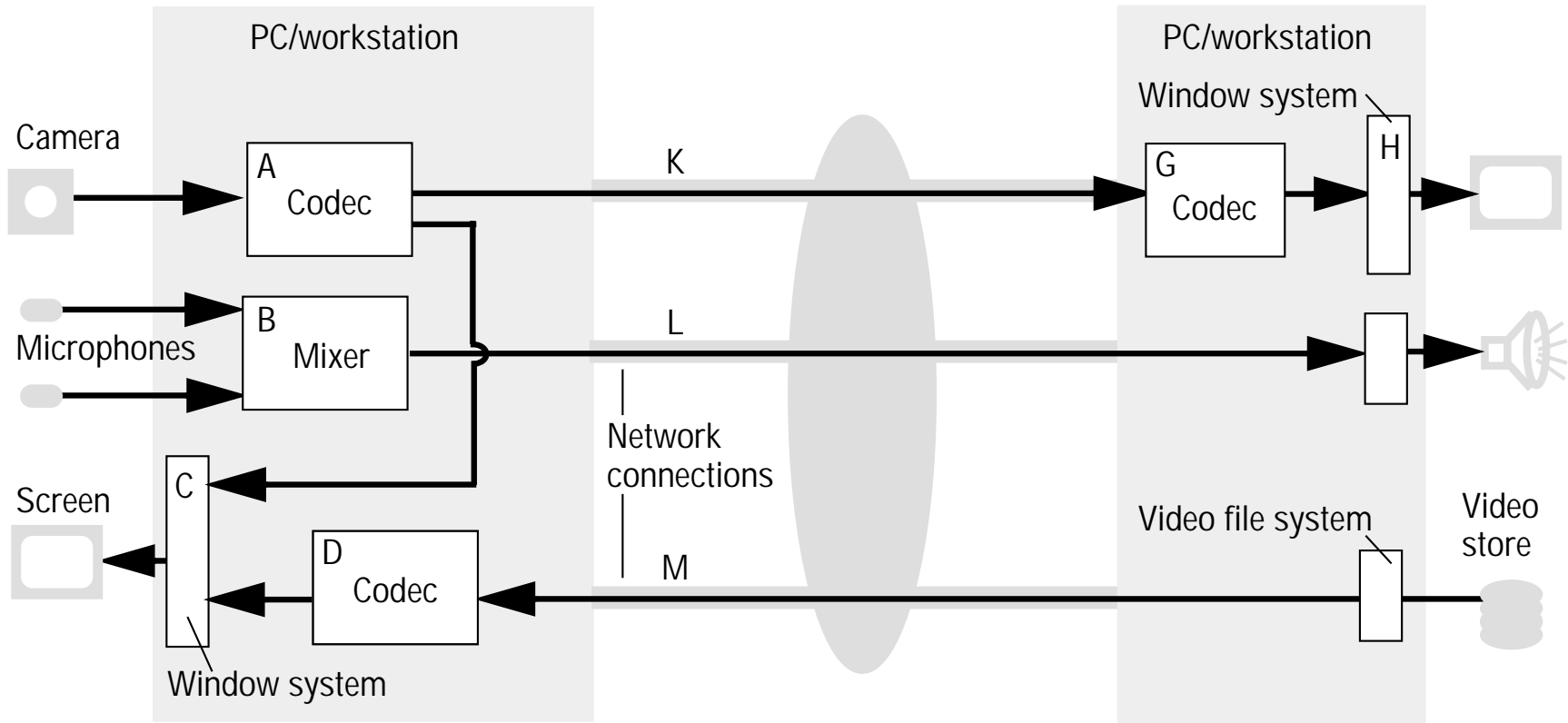


Figure 15.3 Characteristics of typical multimedia streams

	<i>Data rate (approximate)</i>	<i>Sample or frame size frequency</i>	
Telephone speech	64 kbps	8 bits	8000/sec
CD-quality sound	1.4 Mbps	16 bits	44,000/sec
Standard TV video (uncompressed)	120 Mbps	up to 640 × 480 pixels × 16 bits	24/sec
Standard TV video (MPEG-1 compressed)	1.5 Mbps	variable	24/sec
HDTV video (uncompressed)	1000–3000 Mbps	up to 1920 × 1080 pixels × 24 bits	24–60/sec
HDTV video (MPEG-2 compressed)	10–30 Mbps	variable	24–60/sec

Figure 15.4 Typical infrastructure components for multimedia applications



→ : multimedia stream
 White boxes represent media processing components, many of which are implemented in software, including:

- codec: coding/decoding filter
- mixer: sound-mixing component

Figure 15.5 QoS specifications for components of the application shown in Figure 15.4

<i>Component</i>		<i>Bandwidth</i>	<i>Latency</i>	<i>Loss rate</i>	<i>Resources required</i>
Camera	Out:	10 frames/sec, raw video 640x480x16 bits	–	Zero	–
A Codec	In: Out:	10 frames/sec, raw video MPEG-1 stream	Interactive	Low	10 ms CPU each 100 ms; 10 Mbytes RAM
B Mixer	In: Out:	2 × 44 kbps audio 1 × 44 kbps audio	Interactive	Very low	1 ms CPU each 100 ms; 1 Mbytes RAM
H Window system	In: Out:	various 50 frame/sec framebuffer	Interactive	Low	5 ms CPU each 100 ms; 5 Mbytes RAM
K Network connection	In/Out:	MPEG-1 stream, approx. 1.5 Mbps	Interactive	Low	1.5 Mbps, low-loss stream protocol
L Network connection	In/Out:	Audio 44 kbps	Interactive	Very low	44 kbps, very low-loss stream protocol

Figure 15.6 The QoS manager's task

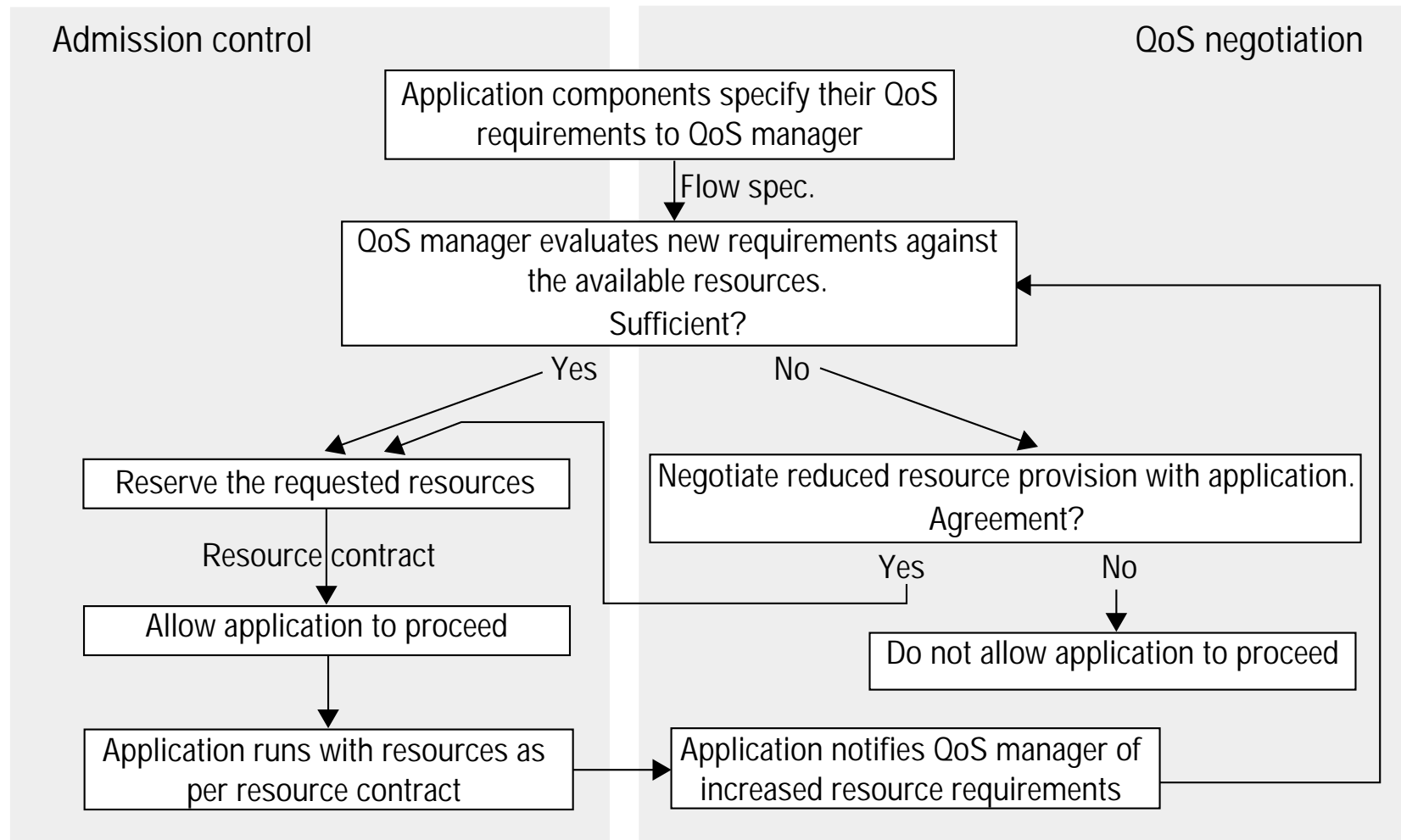
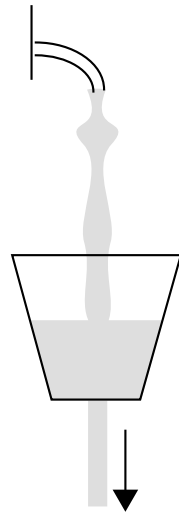


Figure 15.7 Traffic shaping algorithms

(a) Leaky bucket



(b) Token bucket

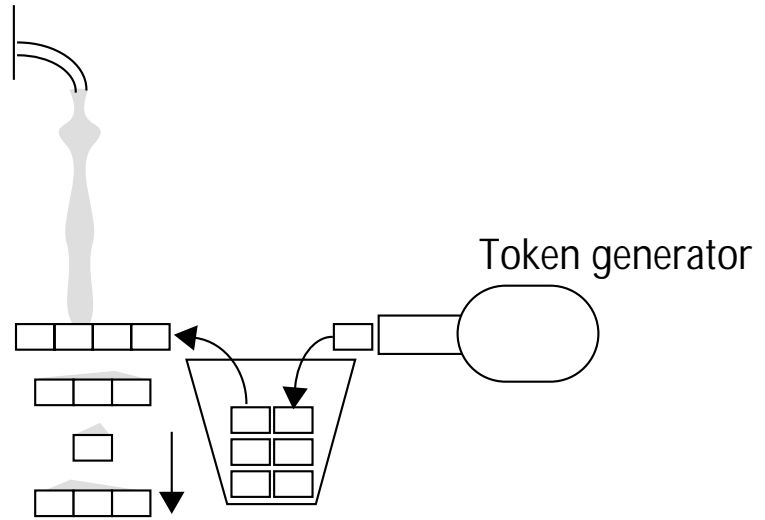


Figure 15.8 The RFC 1363 Flow Spec

	Protocol version
Bandwidth:	Maximum transmission unit
	Token bucket rate
	Token bucket size
	Maximum transmission rate
Delay:	Minimum delay noticed
	Maximum delay variation
Loss:	Loss sensitivity
	Burst loss sensitivity
	Loss interval
	Quality of guarantee

Figure 15.9 Filtering

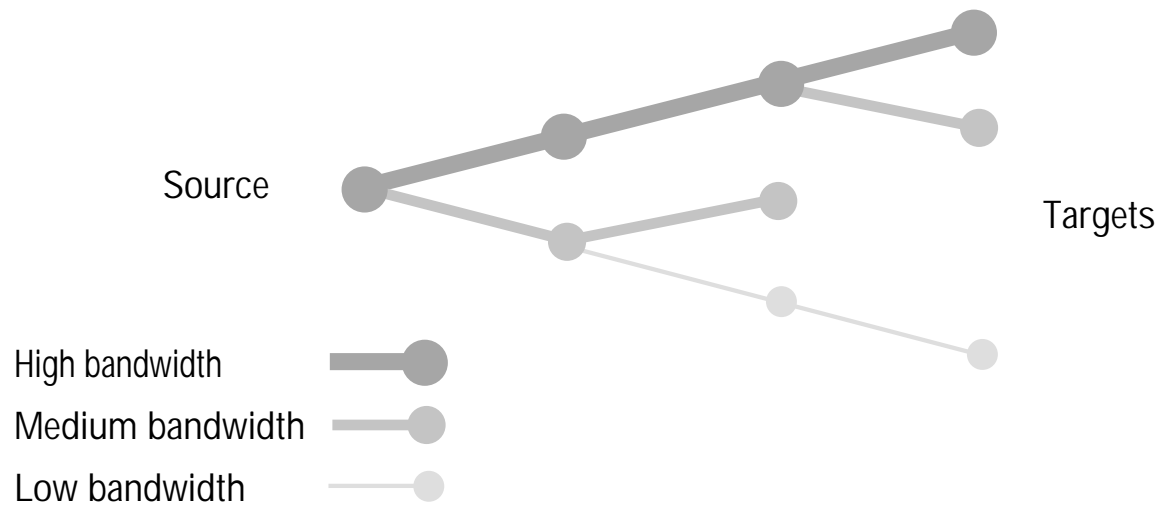


Figure 15.10 Tiger video file server hardware configuration

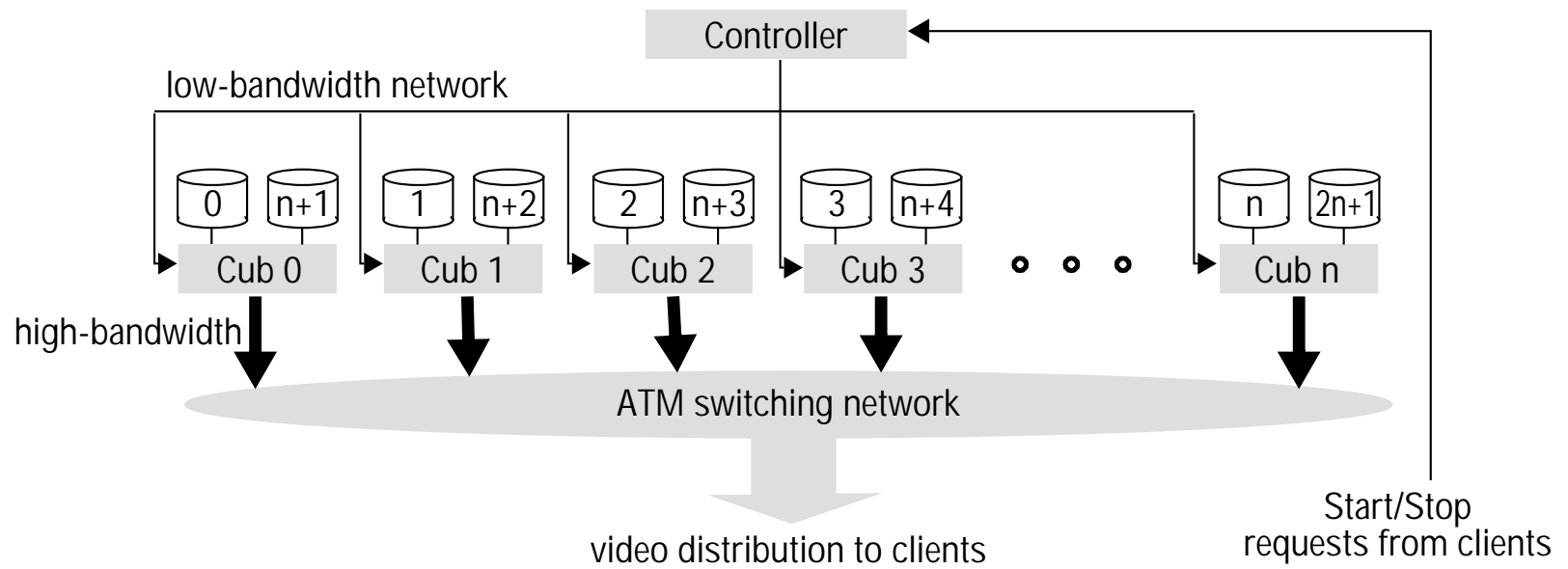


Figure 15.11 Tiger schedule

