

Basler Components



Unicasting and Multicasting with a Basler IP Camera

APPLICATION NOTES

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1 Introduction

This document explains the differences between unicasting and multicasting as they apply to Basler IP Cameras.

Section 2 on [page 2](#) explains the basics of unicasting.

Section 3 on [page 9](#) explains the basics of standard multicasting.

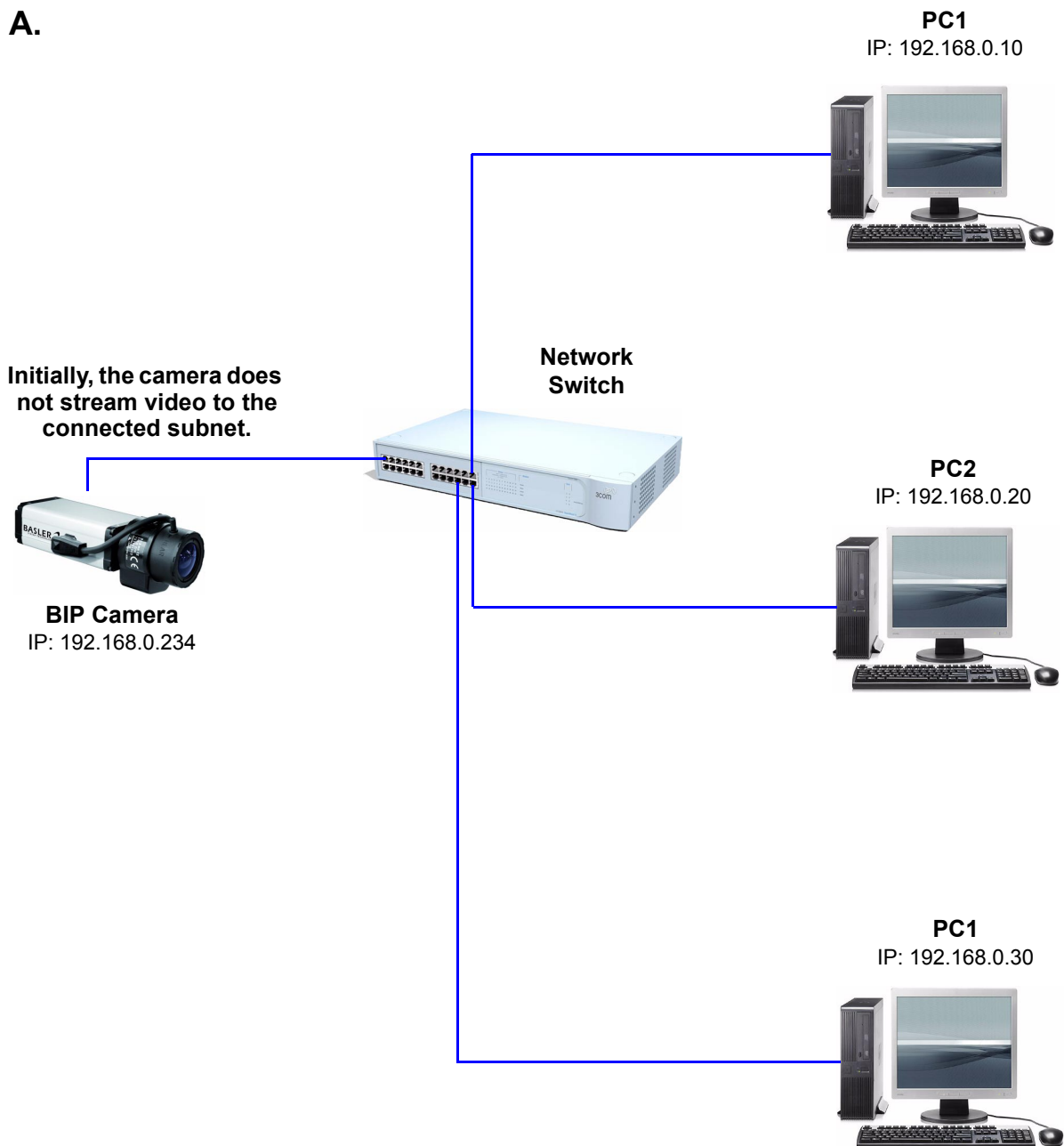
Section 4 on [page 15](#) explains the basics of on-demand multicasting.

2 Unicasting

A unicast connection is always a point-to-point connection between two network communication partners (e.g., a Basler IP Camera and a PC).

To demonstrate, we start with the network setup shown below. The series of illustrations on the following pages shows how unicast streams are established and how they affect the camera.

A.

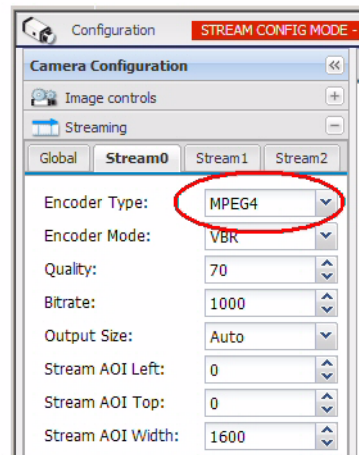


B.

PC1
IP: 192.168.0.10



**One of the PCs
configures the camera to
stream MPEG4
compressed video.**



PC2
IP: 192.168.0.20

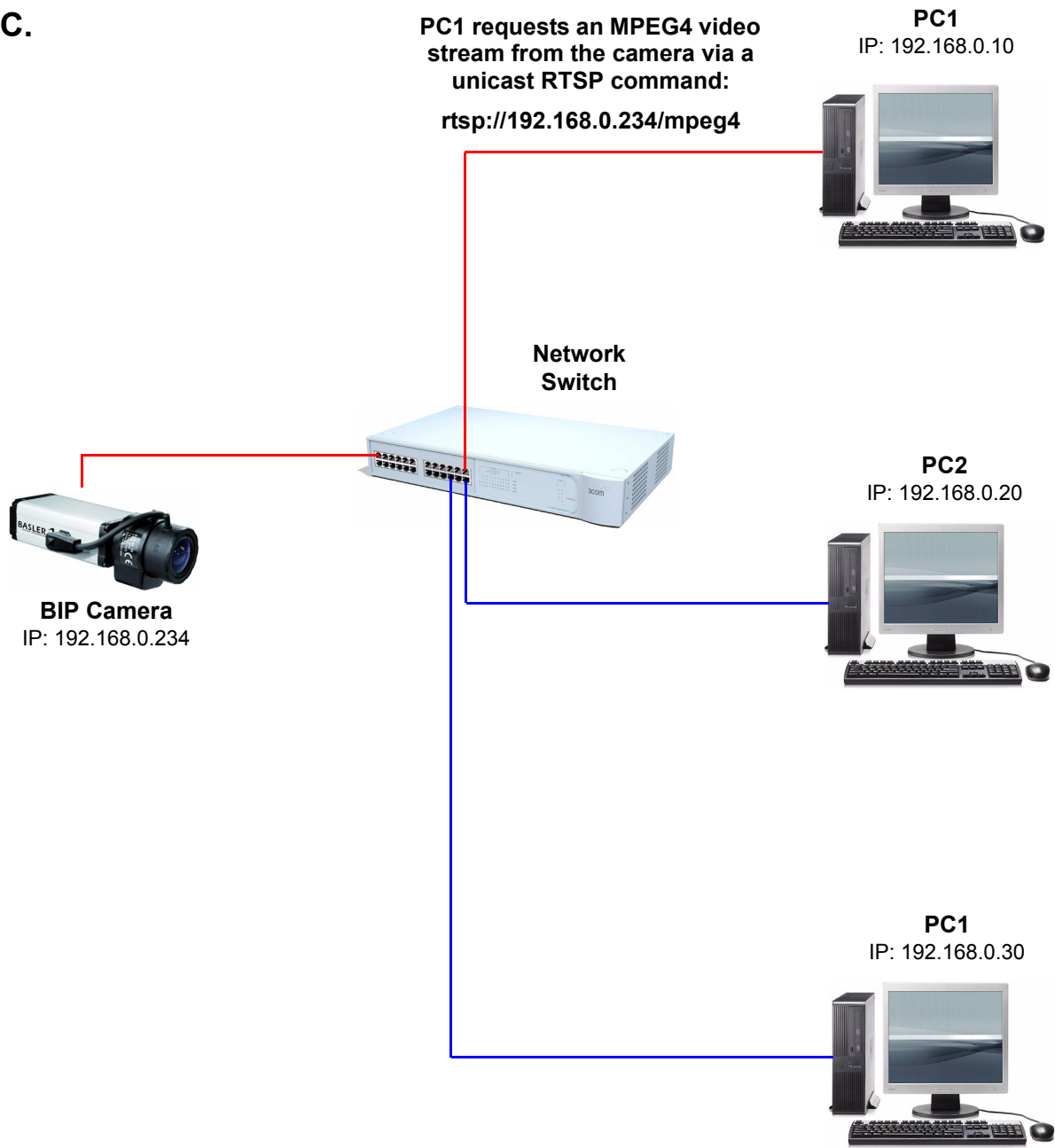


PC1
IP: 192.168.0.30

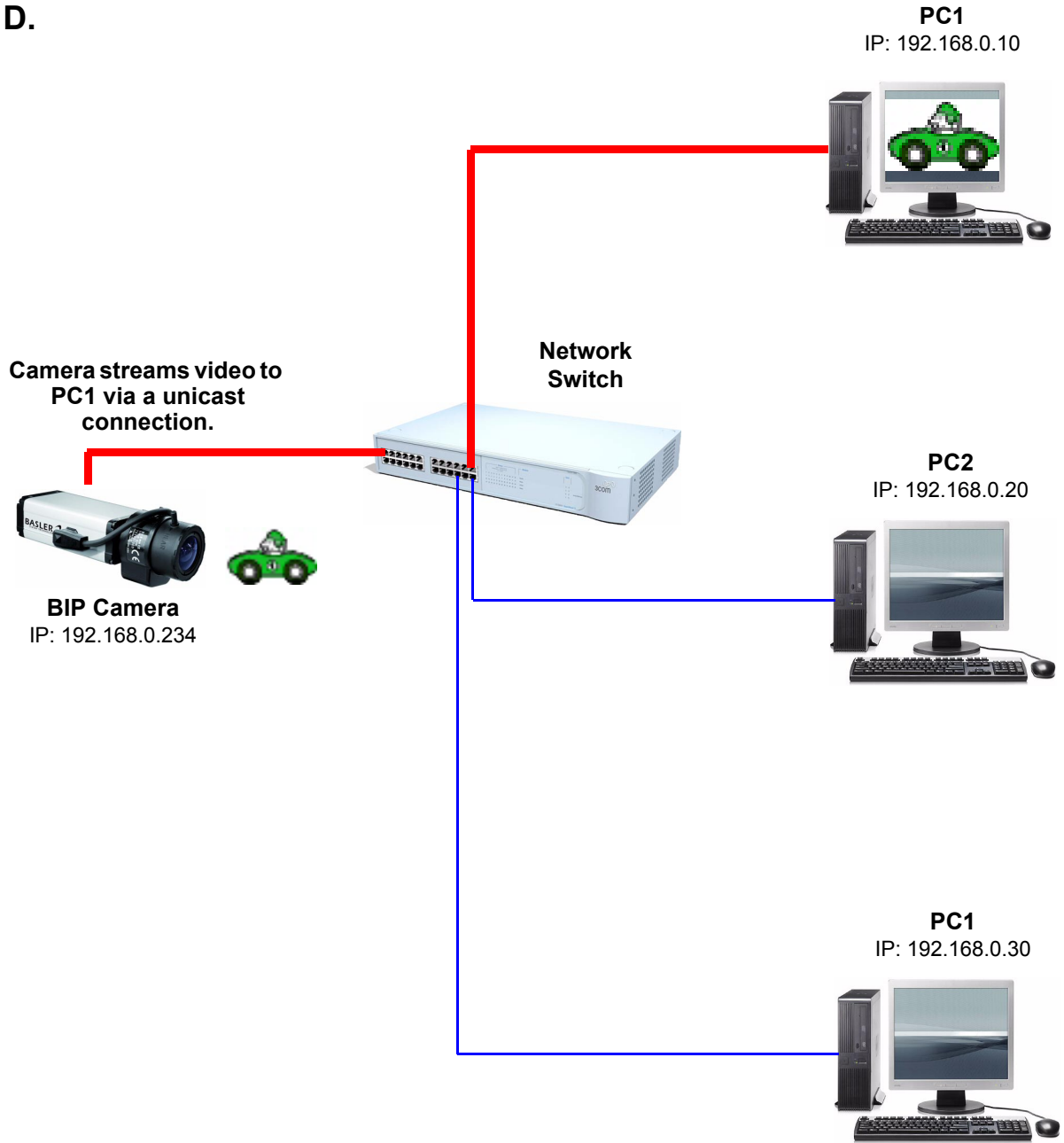


C.

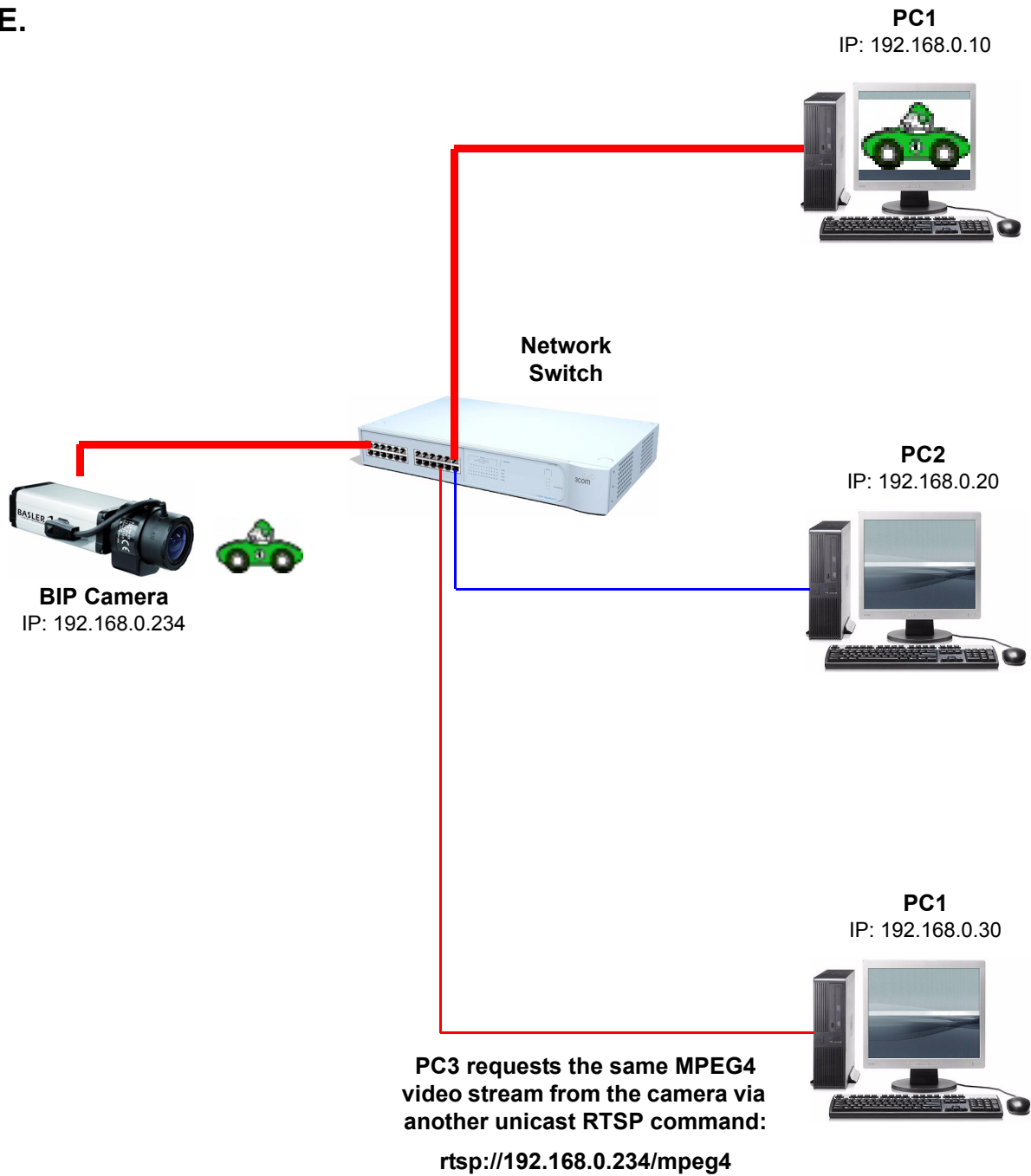
**PC1 requests an MPEG4 video stream from the camera via a unicast RTSP command:
rtsp://192.168.0.234/mpeg4**



D.

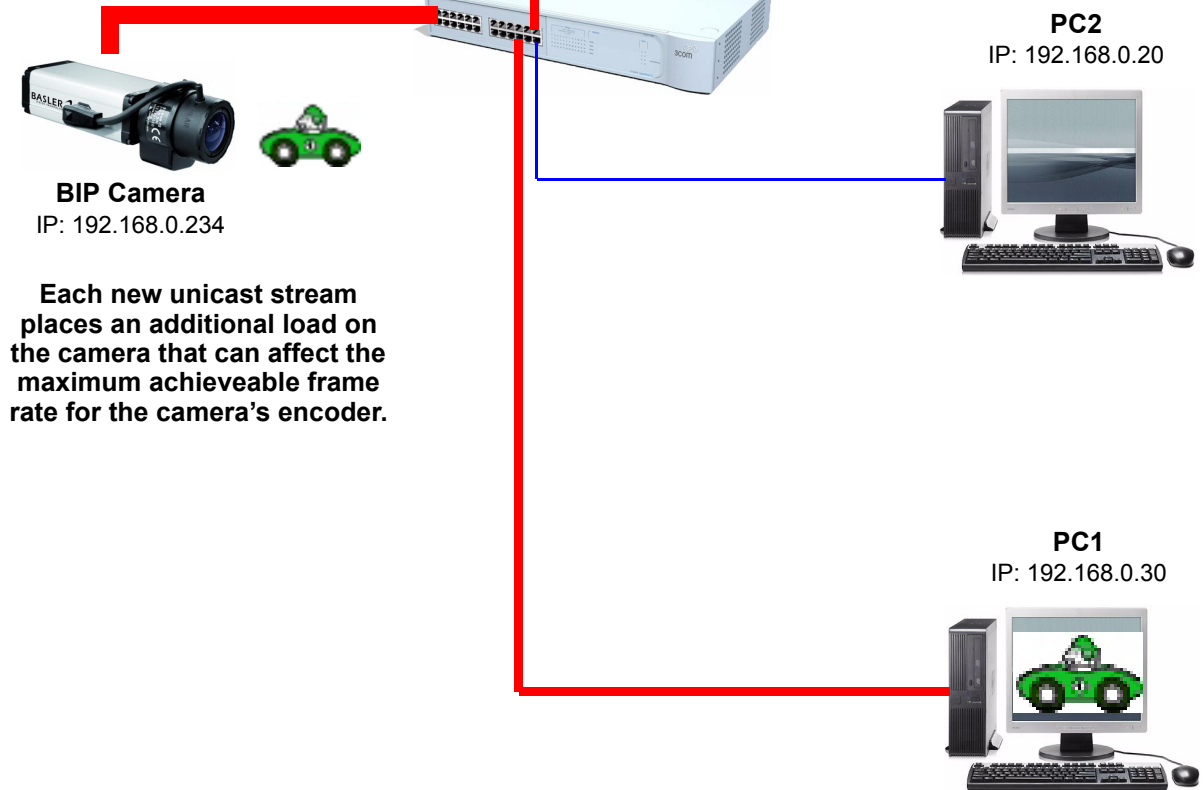


E.



F.

Camera streams video to PC1 and PC3 via two unicast connections. This causes the camera to use twice the network bandwidth it used when streaming to PC1 only.



Each new unicast stream places an additional load on the camera that can affect the maximum achievable frame rate for the camera's encoder.

For Unicasting:

A unicast request sent from the PC to the camera for establishing a video stream can either be HTTP based (for acquiring an MJPEG stream) or RTSP based (for acquiring an MPEG4 stream or H.264 stream). The HTTP and RTSP protocols are TCP/IP based.

The URL for acquiring an MJPEG encoded unicast video stream is:

```
http://<IpCamIpAddr>/cgi-bin/mjpeg?stream=<number>
```

The URL for acquiring an MPEG4 encoded unicast video stream is:

```
rtsp://<IpCamIpAddr>/mpeg4
```

The URL for acquiring an H.264 encoded unicast video stream is:

```
rtsp://<IpCamIpAddr>/h264
```

Where: <IpCamIpAddr> = the IP address of the Basler IP Camera.

<number> = the number of the stream to be acquired.

Video stream unicasting from the camera to a PC can be performed with UDP or TCP/IP based protocols.

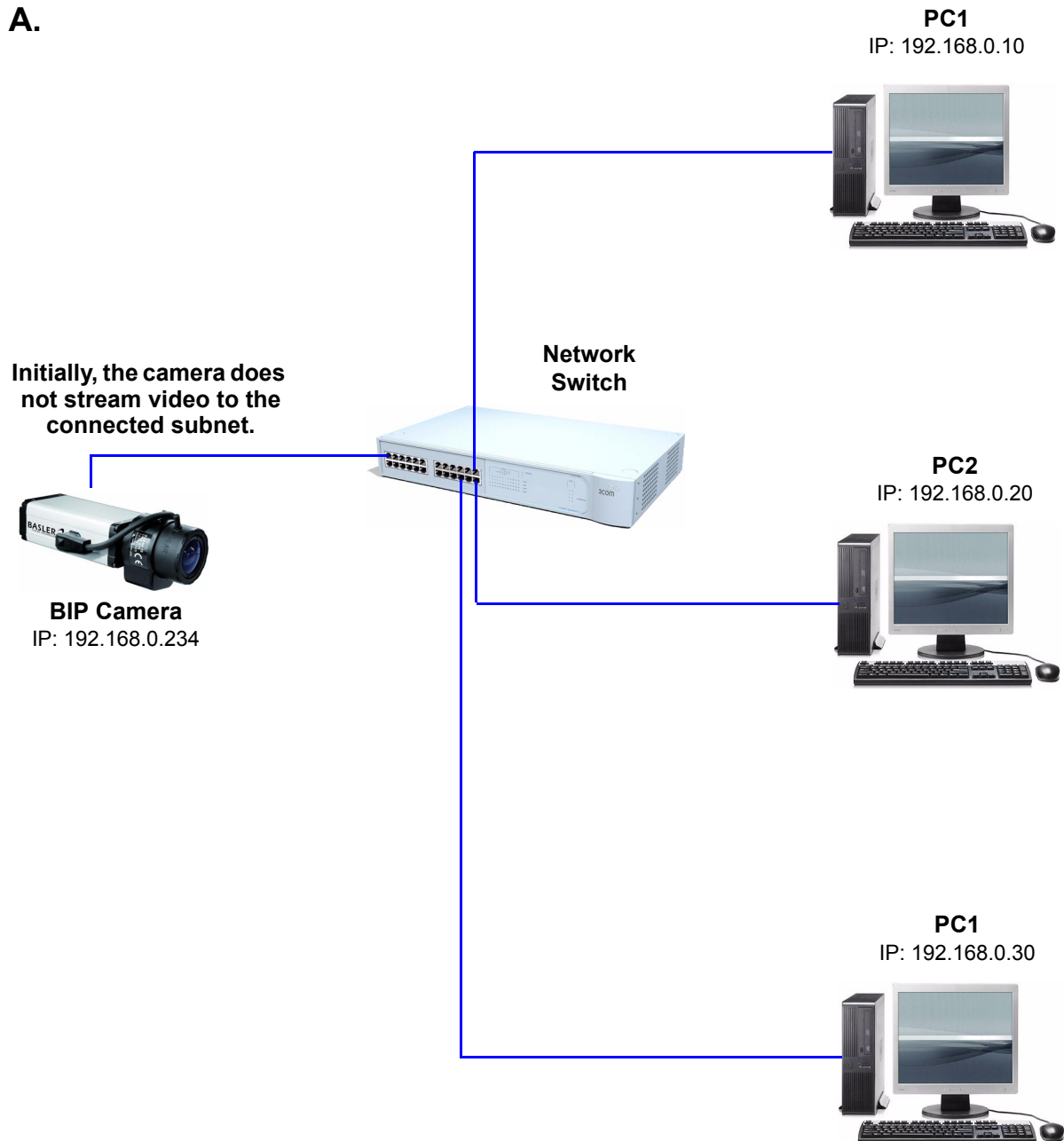
MJPEG always uses the HTTP protocol. MPEG4 and H.264 always use the RTP protocol. RTP can be UDP or TCP/IP based.

3 Standard Multicasting

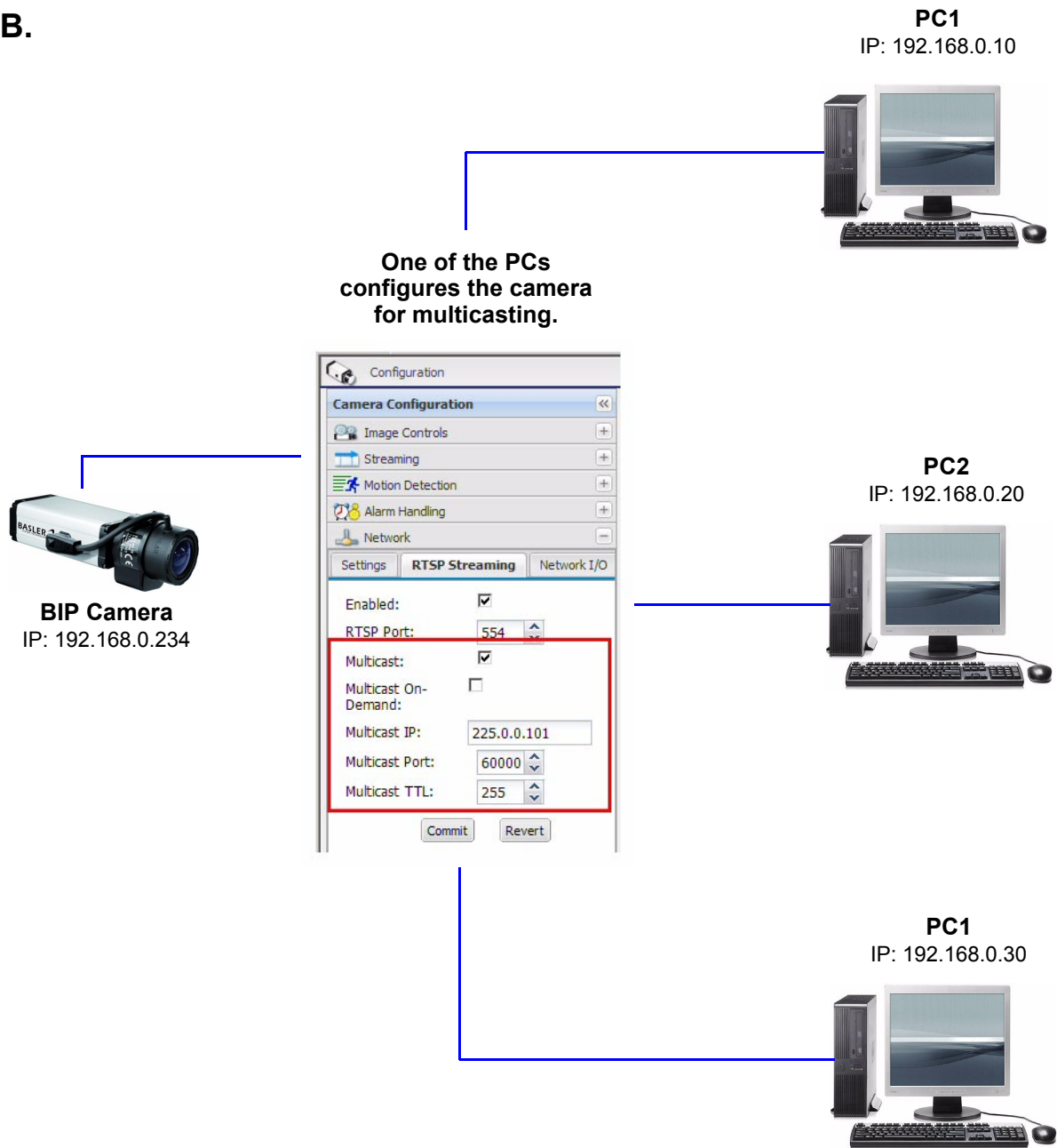
In a multicast setup, a server (e.g., the Basler IP Camera) streams video data to the whole subnet to which it is connected.

To demonstrate, we start with the network setup shown below. The series of illustrations on the following pages shows how a multicast stream is established and how it affects the camera.

A.



B.



C.

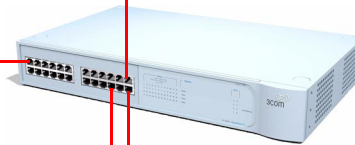
Initially, the PCs won't know anything about the multicast stream from the camera, so they don't receive anything.

PC1
IP: 192.168.0.10



The camera immediately starts streaming video to the whole subnet via a multicast

Network Switch



BIP Camera
IP: 192.168.0.234

PC2
IP: 192.168.0.20



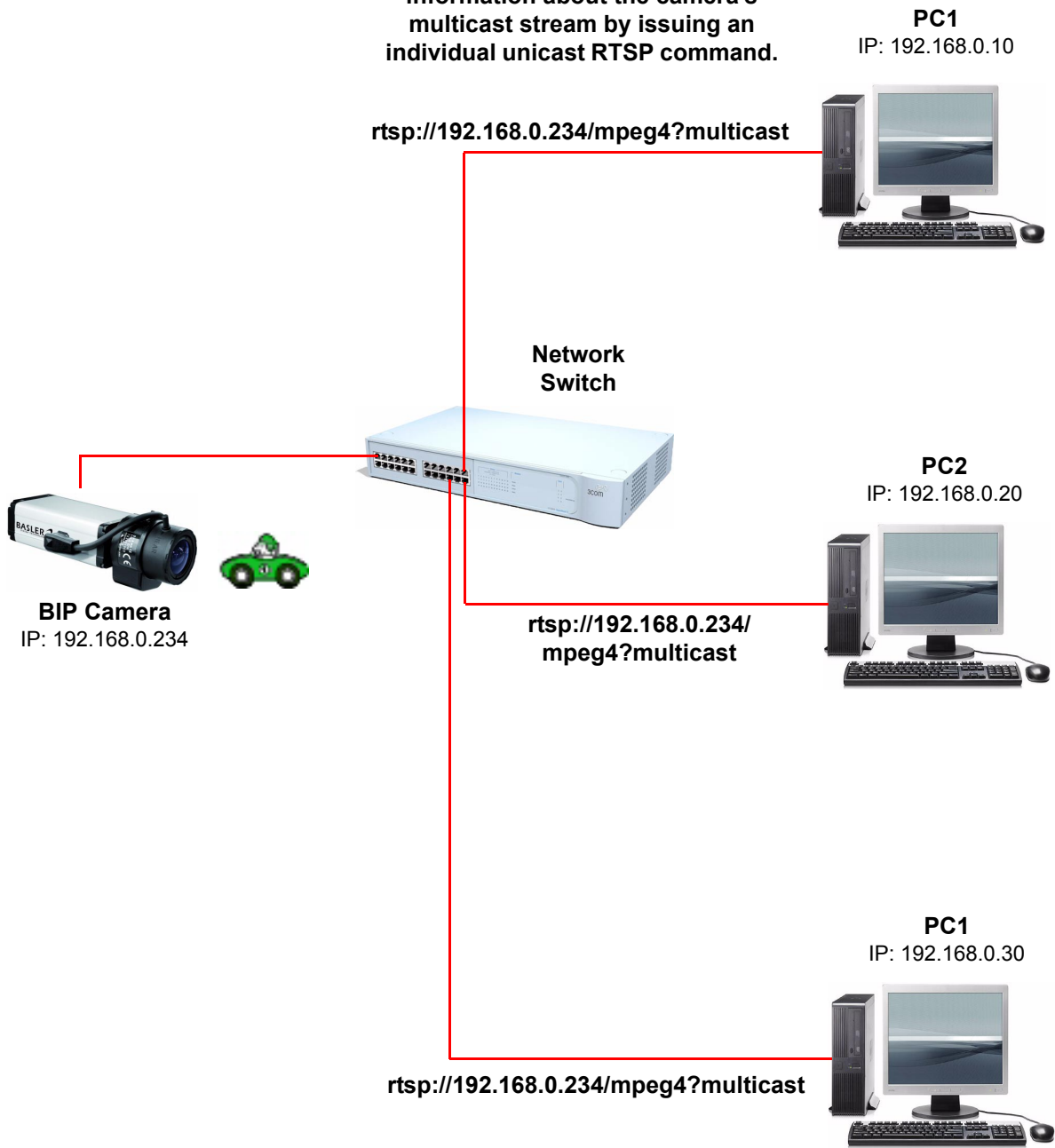
The multicast immediately causes a network load, even though none of the PCs has requested a video stream yet.

PC1
IP: 192.168.0.30

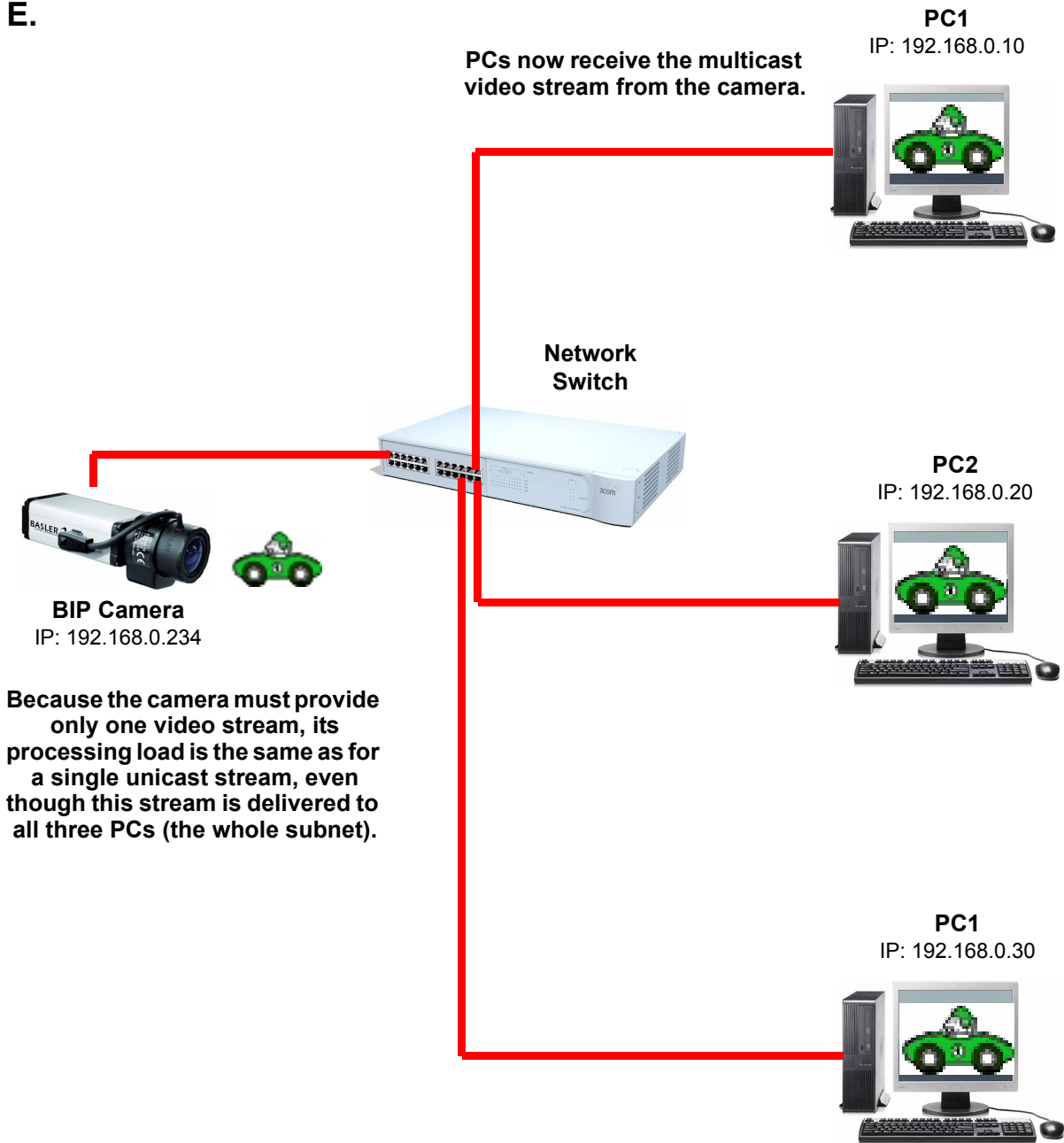


D.

Each PC can now get the required information about the camera's multicast stream by issuing an individual unicast RTSP command.



E.



Because the camera must provide only one video stream, its processing load is the same as for a single unicast stream, even though this stream is delivered to all three PCs (the whole subnet).

For Multicasting:

An RTSP based unicast command (using the camera's unicast IP address) must be send from the PC to the camera so that the PC can get the required information about the camera's multicast stream. Once the required information has been received, the PC can access the multicast stream from the camera.

The URL for acquiring an MPEG4 encoded multicast video stream is:

```
rtsp://<IpCamIpAddr>/mpeg4?multicast
```

The URL for acquiring an H.264 encoded multicast video stream is:

```
rtsp://<IpCamIpAddr>/h264?multicast
```

Where: <IpCamIpAddr> = the IP address of the Basler IP Camera.

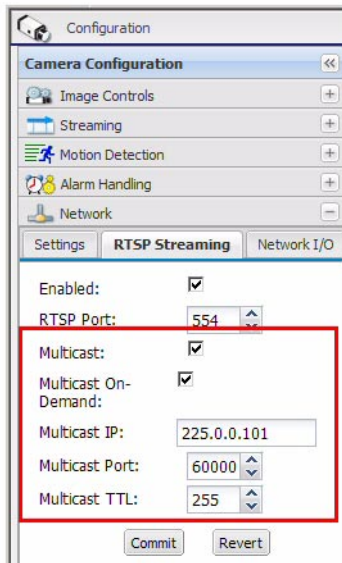
Video stream multicasting from the camera to a PC requires the RTP real time protocol, a UDP based protocol. This explains why MJPEG can not be multicast (transmission of MJPEG encoded video is always HTTP based).

The multicast IP address for which you configure the camera does not really matter as long as it is in the range reserved for multicast IP addresses, i.e., 224.0.0.0 to 239.255.255.255 (class D).

Different multicast IP addresses or different ports can be used to discriminate between multiple multicasting devices in the same subnet.

In addition to receiving a multicast video stream from a camera, a PC can also receive additional unicast streams from the same camera.

4 On-demand Multicasting



When you use a PC to configure your camera for multicasting, you will notice that there are two multicasting check boxes available on the RTSP streaming tab, "Multicast" and "Multicast On-Demand". If only the Multicast box is checked, standard multicasting will be enabled, and multicasting will operate as described in Section 3. But if you also check the Multicast On-Demand box, you will enable on-demand multicasting rather than standard multicasting.

With standard multicasting, the camera starts a multicast stream as soon as multicasting is enabled, and the stream remains active as long as standard multicasting is enabled. When on-demand multicasting is enabled, this is not the case.

When on-demand multicasting is first enabled, the camera does not immediately begin a multicast stream. Instead, it waits for a request from a client. When the first client issues an RTSP "PLAY" request, the camera will begin a multicast stream to the entire network. As long as one or more clients is accessing the multicast stream, the camera will continue the stream. When the last client

accessing the stream uses an RTSP "TEARDOWN" request to close its session, the camera will stop multicast streaming. Multicast streaming will remain stopped until at least one client requests the stream.

Using on-demand multicasting conserves network bandwidth because the camera will only send a multicast stream when it is required, not constantly.

Revision History

Doc. ID Number	Date	Changes
AW00078901000	14 Jan 2009	Initial release of this document.
AW00078902000	23 Mar 2009	Corrected the samples on page 8 . Added Section 4 on page 15 .

