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<http://www.teledynedalsa.com/Genie-Nano>

## *G3-AN0008 Genie Nano Multicasting*

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# How to Multicast with Genie Nano & Spera LT

All Genie Nano GigE models support multicasting.

### **Overview**

Multicasting allows a camera to send an image to multiple computers at the same time. Any device on the same network as the camera can receive multicast image data. This allows for distributed monitoring and processing capabilities.

### **Prerequisites**

The following table lists the recommended Genie Nano firmware and software for this camera model.

Genie Nano Firmware Design	Software SDK
All firmware	Spera LT 8.40 or higher

### **Software**

**Spera LT SDK (full version)**, the image acquisition and control software development kit (SDK) for Teledyne DALSA cameras is available for download from the Teledyne DALSA website:

<http://teledynedalsa.com/imaging/support/downloads/sdks/>

If the required version is not available, contact your Teledyne DALSA representative.

Spera LT includes the CamExpert application, which provides a graphical user interface to access camera features for configuration and setup.

For third-party software SDKs, refer to its documentation for multicast support.

### **Ethernet Switch**

A **Gigabit Ethernet switch** supporting Internet Group Management Protocol (IGMP) v2 is recommended for optimal network performance.

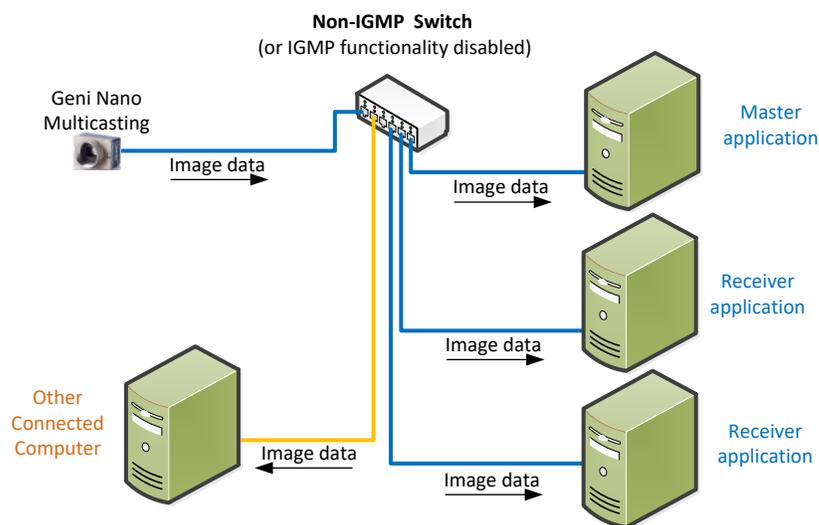
# Multicasting Overview

A GigE Vision camera can use multicasting if the image data stream must be sent to multiple locations. When multicasting, a camera sends image data to a multicast IP address, rather than to a specific host computer IP address. Multiple host computers can subscribe to the camera's multicast and receive image data.

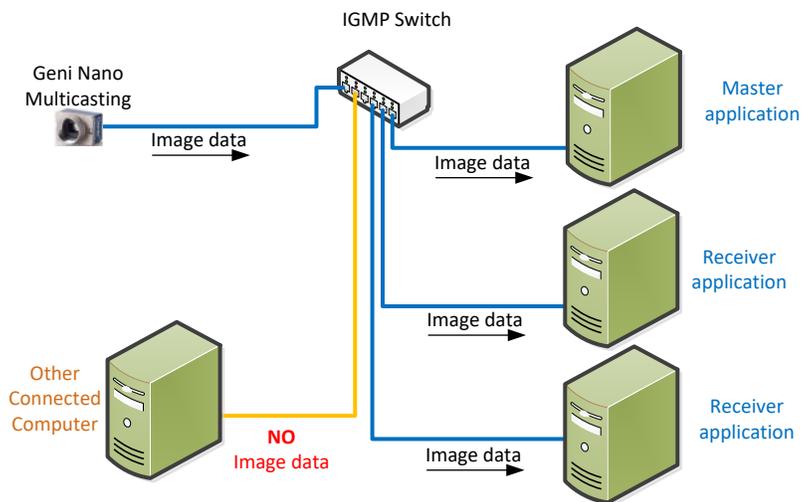
Only one "Master" application can control camera features (read/write access), while any other "Receiver" applications can only receive image data (read-only access).

When a multicast transmission initiates, the Teledyne DALSA GigE Vision driver creates a multicast group. A valid multicast group IP address is within the range of locally administered addresses (239.0.0.0 to 239.255.255.255). The multicast group address is the destination address for the camera image data stream.

When multicasting with a camera connected to a *non-IGMP* Ethernet switch (or a switch with IGMP functionality disabled); the switch forwards the image data to the NICs of all connected devices.



When using an IGMP-capable Ethernet switch, to optimize network traffic enable IGMP snooping on the switch so that it forwards images only to devices that request the multicast rather than to all connected devices.



**Note:** The camera does not send the same image multiple times to each computer; the switch duplicates image data as required.

Refer to the switch documentation for information on how to verify IGMP settings (typically IGMP snooping is enabled by default).

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## Requirements for Multicasting

To use multicast at least two Sopera LT applications are required running on different host computers; a “Master” application and at least one “Receiver” application:

- **Master** application: connects to the camera with *read/write access* to enable multicast and start image acquisition. This is required since the *multiCastStreamingEnable* feature is part of the GigE Vision Host Controls category and is not saved with the camera. In addition, the multicast port is assigned only when multicast is enabled.
- **Receiver** application: connects to the camera with *read-only access* to retrieve the multicast information, such as the multicast group IP address and port assignment, as well as the image format, to create the transfer object to acquire images from the camera.

At the application level, the Sopera LT API sets the access level to a camera when constructing a SapAcqDevice object using its *readOnly* parameter.

```
SapAcqDevice(SapLocation location = SapLocation::ServerSystem, BOOL readOnly = FALSE);
```

When the *readOnly* parameter is set to FALSE, the application operates as a master for multicast; TRUE is required for receiver applications.

In addition:

- **Sopera LT Version:** All Sopera LT applications connecting to a camera should use the same version of Sopera LT to avoid possible incompatibility errors between versions.
- **Control (Multicast):** For host systems running multicast applications, verify that the Camera Default Write Mode is set to Control (Multicast); refer to the Set the Camera Default Write Mode section.
- **Packet Size:** All devices on the network must use the same packet size. It is recommended to use the maximum packet size supported by all network devices to reduce packet overhead; refer to the Important System Configuration Information section.
- **Image Format and Size:** Any buffers used by receiver applications should correspond to the camera settings. If the master application changes acquisition image-related features, the receiver application must be updated accordingly.

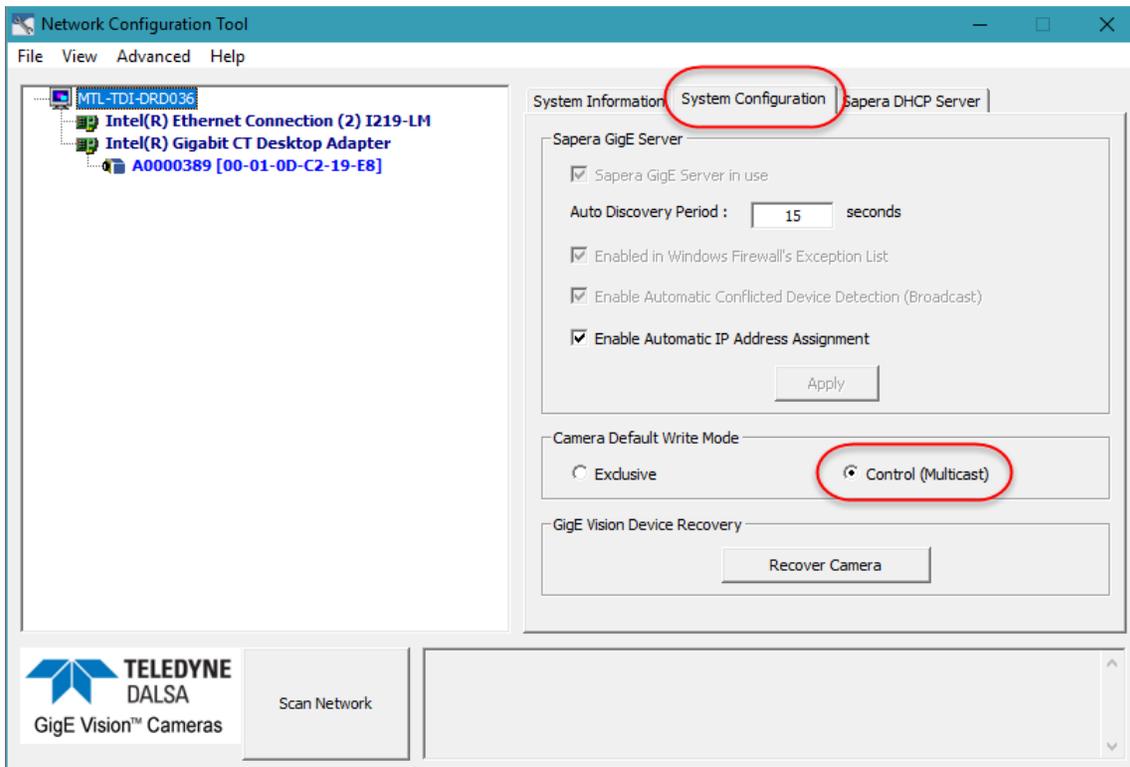
## Set the Camera Default Write Mode

The default connection mode in Sapera LT is “Exclusive” mode. Exclusive mode only allows one application to connect to the camera; any requests to access the camera from other applications will be denied.

For multicast, the Camera Default Write Mode must be set to **Control (Multicast)**.

When the host system is in this mode, applications running on the system can connect to cameras in read-only mode, provided no application is connected to the camera in “Exclusive” mode. However, only one application can connect to the device with read/write access.

Use the Teledyne DALSA Network Configuration Tool (available through the Start Menu under Teledyne DALSA) to specify the Camera Default Write Mode. This parameter is set at the system level in the System Configuration tab.



An advantage of setting this parameter using the Network Configuration Tool is that it only has to be set one time for all applications, and remains in this mode at subsequent system startups.

Alternatively, it can be set at the application level using the Device Access Privilege Control (*deviceCCP*) feature, available in the GigE Vision Transport Layer category. In CamExpert, the possible parameter values are “Exclusive Access” or “Control Access”.

Category	Parameter	Value
Camera Information	Device Link Selector	0
<b>☒ Sensor Control</b>	Device Link Throughput Limit	On
I/O Controls	Device Link Throughput Limit (in Bps)	115000000
Counter And Timer Control	Stream Channel Selector	0
<b>☒ Advanced Processing</b>	Device Link Speed (in Mbps)	1000
Cycling Preset	PacketSize	1500
Image Format Controls	Interpacket Delay	2
Metadata Controls	Packet Resend Buffer Size (in MB)	6.0
Acquisition and Transfer Contr...	IP Configuration Status	DHCP
Action Control	Current IP Address	169.254.8.78
<b>☒ Event Control</b>	Current Subnet Mask	255.255.0.0
GigE Vision Transport Layer	Current Default Gateway	0.0.0.0
File Access Control	Current IP set in LLA	True
GigE Vision Host Controls	Current IP set in DHCP	True
	Current IP set in PersistentIP	False
	Primary Application IP Address	169.254.0.120
	Device Access Privilege Control	Control Access
	Current Heartbeat Timeout	Exclusive Access
	GVCP Heartbeat Disable	Control Access
	Communication Timeout (in msec)	0
	Communication Retransmissions Count	0

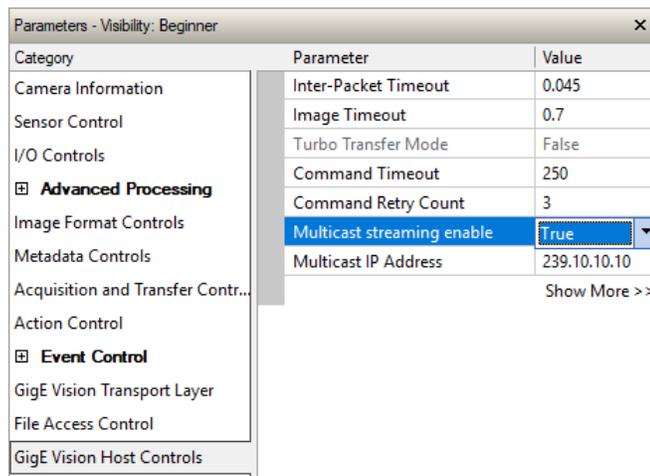
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## Sequence of Application Operations

To ensure proper operation of multicast, application operations should be executed in the following order:

1. Start the master application, verify the required acquisition parameters such as the image format and size, and set the **Multicast enable streaming** (*multiCastStreamingEnable*) feature to True. If necessary, change the Multicast IP Address from the default setting.

In CamExpert, these features are available in the GigE Vision Host Controls category:



2. Start the receiver application, connect to the camera and start the acquisition. The Spera LT SapAcqDevice and SapTransfer objects are created using the settings provided by the currently active master application.
3. In the master application, start the acquisition; images will be received by any currently connected receiver application with an active acquisition.

Starting the acquisition after the receiver application has connected avoids possible network issues that can occur since the camera may delay read requests if it is grabbing images.

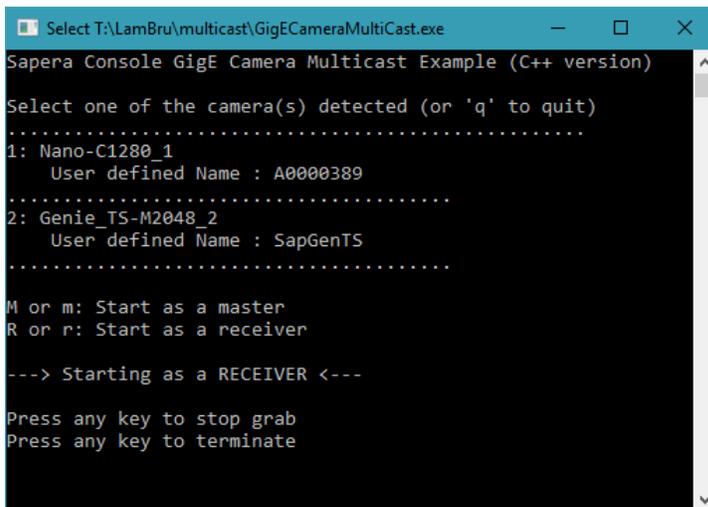
In addition, the multicast port is only assigned when multicast is enabled by the master application; a receiver application that attempts to create a transfer object and acquire images when multicast is not enabled will not be able to acquire images. Receiver application transfer objects must only be created if the multicast enable state is true; if the multicast enable state changes, new transfer objects must be created since a new multicast port is assigned.

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## Sapera LT Multicast Example

Sapera LT includes an example program and source code that demonstrates how to connect to a camera as a receiver or master and initiate a multicast broadcast.

The console program allows you to select an available camera, connect as master or receiver, and display the acquisition.



```
Select T:\LamBru\multicast\GigECameraMultiCast.exe
Sapera Console GigE Camera Multicast Example (C++ version)
Select one of the camera(s) detected (or 'q' to quit)
.....
1: Nano-C1280_1
   User defined Name : A0000389
.....
2: Genie_TS-M2048_2
   User defined Name : SapGenTS
.....
M or m: Start as a master
R or r: Start as a receiver

---> Starting as a RECEIVER <---

Press any key to stop grab
Press any key to terminate
```



Example programs are available in the <install directory>\Teledyne DALSA\Sapera\Examples folder, as compiled binaries or .NET/C++ solutions.



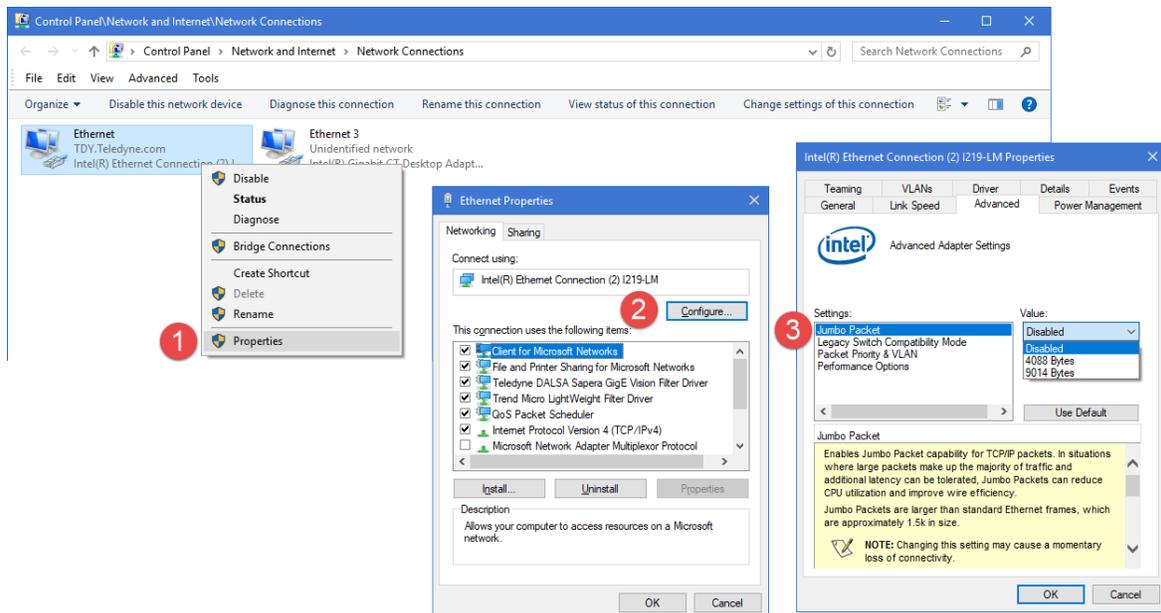
## Important System Configuration Information

### Verify the Packet Size of Network Devices

For the Genie Nano camera, the PacketSize (*GevSCPSPacketSize*) feature is available in the GigE Vision Transport Layer category, as shown here in CamExpert.

Category	Parameter	Value
Camera Information	Device Link Selector	0
<b>Sensor Control</b>	Stream Channel Selector	0
I/O Controls	Device Link Speed (in Mbps)	1000
Counter And Timer Control	<b>PacketSize</b>	1500
<b>Advanced Processing</b>	Interpacket Delay	2
Cycling Preset	Current IP Address	169.254.8.78
Image Format Controls	Current Subnet Mask	255.255.0.0
Metadata Controls	Current Default Gateway	0.0.0.0
Acquisition and Transfer Contr...	GVCP Heartbeat Disable	Not Enabled
Action Control	<< Less	More >>
<b>Event Control</b>		
GigE Vision Transport Layer		
File Access Control		
GigE Vision Host Controls		

For the network interface card (NIC), use the Windows Control Panel to open the Network and Sharing Center to access the required Ethernet connection properties dialog. Click **Configure** to open the associated NIC properties dialog; the actual parameter setting name and location can vary depending on the device.

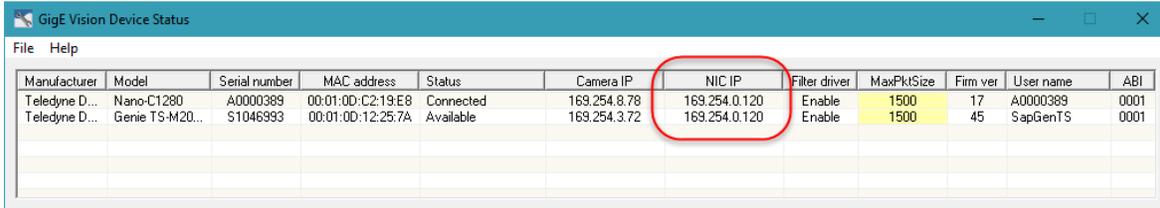


For all other network devices connected to a subnet for multicasting, such as switches or other equipment, refer to the device documentation.

## Using a Camera with Persistent IP

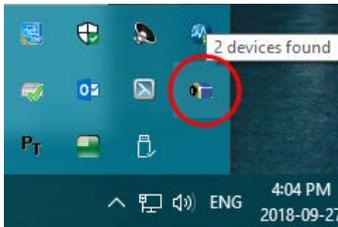
When multicasting with a camera that uses a persistent IP address, set the default gateway to any NIC it is connected to.

The IP address of the NIC is available in the GigE Vision Device Status window or in the Teledyne DALSA Network Configuration Tool.



Manufacturer	Model	Serial number	MAC address	Status	Camera IP	NIC IP	Filter driver	MaxPktSize	Firm ver	User name	ABI
Teledyne D...	Nano-C1280	A0000389	00:01:0D:C2:19:E8	Connected	169.254.8.78	169.254.0.120	Enable	1500	17	A0000389	0001
Teledyne D...	Genie TS-M20...	S1046993	00:01:0D:12:25:7A	Available	169.254.3.72	169.254.0.120	Enable	1500	45	SapGenTS	0001

The GigE Vision Device Status can be opened using its Windows tray icon.



To specify the default gateway in the camera, use the Teledyne DALSA Network Configuration Tool, select the device and specify the required default gateway address in the Device IP Configuration tab. Click **Apply** to execute the change.

