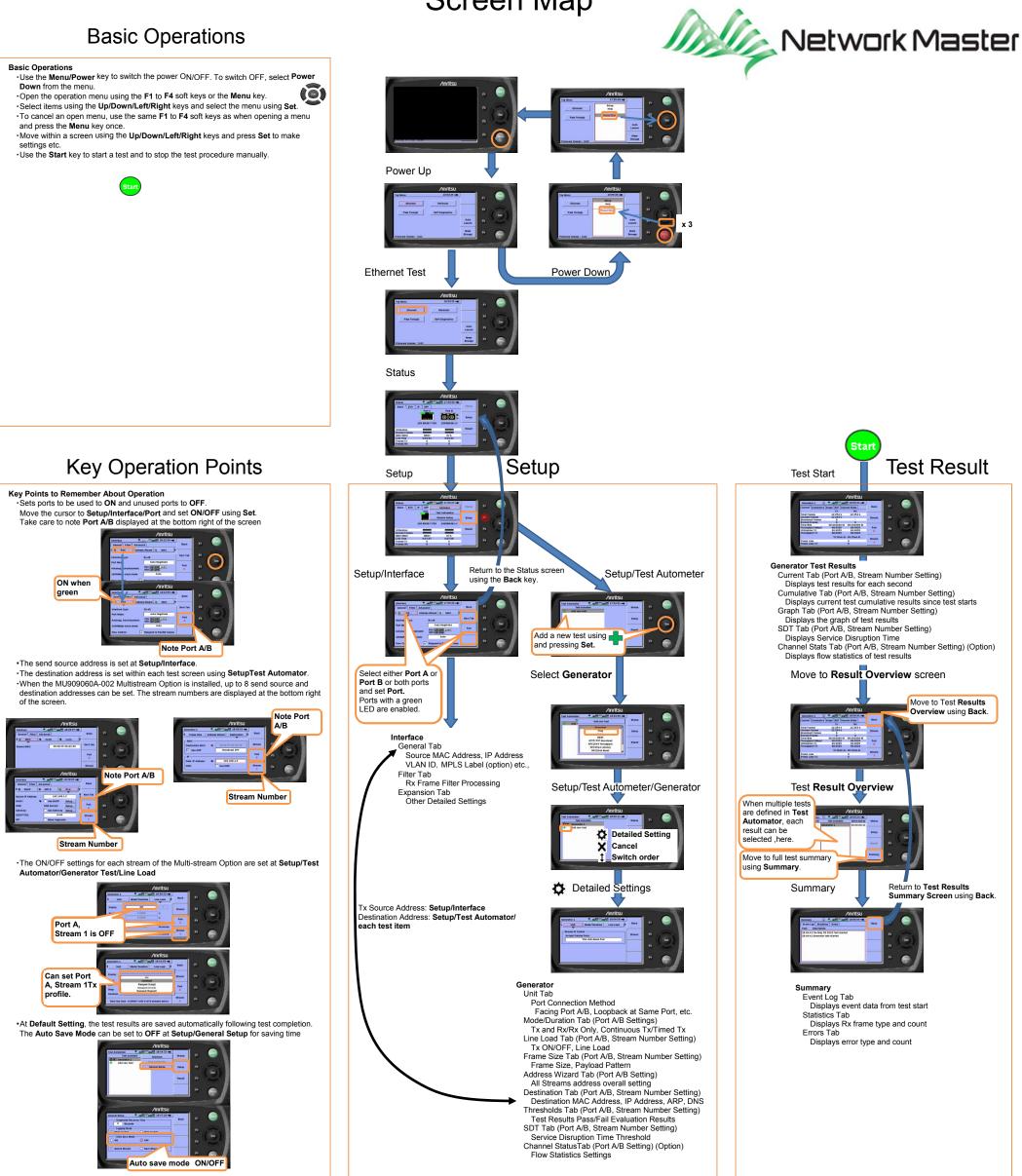
# MU909060A GigE Operation Example Screen Map



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#### Ethernet

Although Ethernet DIX and IEEE 802.3 are quite similar in many respects, certain service differences distinguish the two specifications. Ethernet DIX provides services corresponding to Layers 1 and 2 of the OSI reference model, and IEEE 802.3 specifies the physical layer (Layer 1) and the channel-access portion of the link layer(Layer 2). In addition, IEEE 802.3 does not define a logical link-control protocol but does specify several different physical layers, whereas Ethernet defines only one. The Frame Length except for Preamble is from 64 to 1518bytes in both Ethernet DIX and 802.3.

#### Ethernet DIX

Preamble	DA	SA	Туре	DATA	FCS
DA (48bits) : Do SA (48bits) : So Type (16bits) : It's sure to be m	its): AA AA AA AA estination MAC Ad ource MAC Addres The value identifie iore than 0x0600.T 0800: IPv4	dress s s the protocol enca			e frame.

0x0806 :ARP	0x880B :PPP
0x8035 :Reverse ARP	0x8847 :MPLS Unicast
0x809B :Appletalk	0x8848 :MPLS Multicast
0x8137-8138 :Novell,Inc	
FCS(32bits) : Frame Check Sequence	

#### 802.3

	Preamble	DA	SA	Length	DATA	FCS
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Length (16bits) : The length indicates the number of bytes of data that follows this field.

#### VLAN Tag

Using VLAN tagging, the following tagging frame is inserted between SA and Type field in Ethernet frame.						
TPID	QoS	CFI	VID			

TPID (16bits) : Tag Protocol Identifier, 0x8100 fixed

QoS (3bits) : Quality of Service

CFI (1bit) : Canonical Format Indicator. If set to 1, it indicates the presence of the Source-Routing Information(RIF) field after Length/Type field. **VID (12bits)** : 0x000,0x001 and 0xFFF are reserved.

#### IPv4 (Internet Protocol version4)

Version (4bits) : 4	Version IHL	Type of Service	Tc	otal Length	
IHL (4bits) : Internet Header Length is the	Ident	ification	Flags Fragment Offset		
length of the internet header in 32 bit words,	Time of Live	Protocol	Header Checksum		
and thus points to the beginning of the data.	Source Address				
Note that the minimum value for a correct header is 5.	Destination Address				
1100UCI 15 J.		Padding			

Type of Service (4bits) : The Type of Service provides an indication of the abstract parameters of the quality of service desired. These parameters are to be used to guide the selection of the actual service parameters when transmitting a datagram through a particular network

J J .	
Bits 0-2 :	Precedence.

1 = Low Delay. Bit 3 : 0 = Normal Delay,

Bits 4

0

0 = Normal Throughput,1 = High Throughput. 0 = Normal Reliability, 1 = High Reliability Bits 5 : 1 = High Reliability

Precedence

Reserved for Future Use. Bit 6-7

Precedence

111 - Network Control 110 - Internetwork Control

101 - CRITIC/ECP 100 - Flash Override

- 011 Flash 010 Immediate
- 001 Priority 000 - Routine

Total Length (16bits) : Total Length is the length of the datagram, measured in octets, including internet header and data.

Identification (16bits) : An identifying value assigned by the sender to aid in assembling the fragments of a datagram. Flags (3bits) : Various Control Flags. Bit 0: reserved, must be zero

DF

0

MF

Destination Port

Bit 1: (DF) 0 = May Fragment, 1 = Don't Fragment. Bit 2: (MF) 0 = Last Fragment, 1 = More Fragments.

Fragment Offset (13bits) : This field indicates where in the datagram this fragment belongs.

The fragment offset is measured in units of 8 octets (64 bits). The first fragment has offset zero. Time to Live (8bits) : This field indicates the maximum time the datagram is allowed to remain in the internet system. Protocol (8bits) : This field indicates the next level protocol used in the data portion of the internet datagram

1-ICMP 2-IGMP 6-TCP 17-UDP

Header Checksum (16bits) : A checksum on the header only. Since some header fields change (e.g., time to live), this is recomputed and verified at each point that the internet header is processed. The checksum field is the 16 bit one's complement of the one's complement sum of all 16 bit words in the header. For purposes of computing the checksum, the value of the checksum field is zero.

# TCP (Transmission Control Protocol)

Version	(4bits)	: 4

		Source Fort Des						SUNATION FOR			
	Source Address										
Sequence Number (32bits) :		Destination Address									
The sequence number of the first data octet in this segment (except when SYN is present). If SYN is present the sequence number is the initial sequence number	Data Offset	Reserved	URG	ACK	PSH	PST	SYN	FIN	Неа	der Checksum	
(ISN) and the first data octet is ISN+1.	Checksum Urgent Pointer										
	Options Padding				Padding						
											_

Source Port

Acknowledgment Number(32bits) : If the ACK control bit is set this field contains the value of the next sequence number the sender of the segment is expecting to receive. Once a connection is established this is always sent. Data Offset (4bits) : The number of 32 bit words in the TCP Header. This indicates where the data begins. The TCP header (even one including options) is an integral number of 32 bits long.

Reserved (6bits) : Reserved for future use. Must be zero. Control Bits (6bits) :

URG : Urgent Pointer field significant ACK : Acknowledgment field significant

#### 10Mbps

	IEEE 802.3						
	10BASE5	10BASE2	10BASE-T	10BASE-FL			
Encoding	Manchester						
Maximum Segment Length	500m	185m	100m	2000m			
Cable	Coaxial Cable 50Ω (φ12 mm)	Coaxial Cable 50Ω (φ5 mm)	UTP (Category 3)	MMF 62.5/125µm			
wavelength of light		-		850 nm			

#### 100Mbps

	IEEE 802.3u						
	100BASE-T4	100BASE-T4 100BASE-TX					
Encoding	8B6T	8B6T 4B					
Maximum Segment Length	100	100 m					
Cable	UTP (Category 3,4,5)						
wavelength of light							

#### 1Gbps

0

		IEEE 8	302.3z		IEEE 802.3ab	
	1000BASE-CX	1000BASE-SX	1000BASE-LX	1000BASE-LH	1000BASE-T	1000BASE-ZX
Encoding		8B1				
Maximum Segment Length	25 m	550 m	5000 m (SMF) 550 m (MMF)	10 km	100 m	80 km
Cable		MMF 50/125µm MMF 62.5/125µm	MMF 50/125μm MMF 62.5/125μm SMF 10 μm	SMF 10 µm	UTP (Category 5)	
wavelength of light	-	850 nm	1310 nm	1310 nm	-	1550 nm

# IPv6 (Internet Protocol version6)

Version (4bits) : 6 Traffic Class (8bits) : Similar to ToS field in IPv4. Flow Label (20bits) : Flow label is used by a source to label sequences of packets for which it requests special handling by the IPv6 routers, such as non-default quality of service or "real-time" service.

Version Traffic Class Flow Label						
Payload Length		Next Header	Hop Limit			
Source Address						
Destination Address						

TTL

Payload Length (16bits) : Length of the IPv6 payload, i.e., the rest of the packet following this IPv6 header, in octets. (Note that any extension headers present are considered part of the payload, i.e., included in the length count.) Next Header (8bits) : Identifies the type of header immediately following the IPv6 header. Uses the same values as the IPv4 Protocol field.

Hop Limit (8bits) : Decremented by 1 by each node that forwards the packet. Equal to TTL field in IPv4. Source Address (128bits) : Address of the originator of the packet. Destination Address (128bits) : Address of the intended recipient of the packet.

In IPv6, optional internet-layer information is encoded in separate headers that may be placed between the IPv6 header and the upper-layer header in a packet. There are a small number of such extension headers, each identified by a distinct Next Header value. As illustrated in these examples, an IPv6 packet may carry zero, one, or more extension headers, each identified by the Next Header field of the preceding header: 

Ex 1)	Next	Header = Header = TCP	DATA	/					
Ex 2)	Next R	Header Header = outing	Routing Heade Next Header = Fragment	Next He	ader = P	Fragment of TCP Header & DATA			
The II	he IPv6 aggregatable global unicast address format is as follows(Total 128bits):								
FP	TLA ID	RES	NLD ID	SLD ID		Interface ID			

FP (3bits) : Format Prefix,001 fixed. For Aggregatable Global Unicast Addresses. TLA ID (13bits) : Top-Level Aggregation Identifier RES (8bits) : Reserved for future use

NLA ID (24bits) : Next-Level Aggregation Identifier SLA ID (16bits) : Site-Level Aggregation Identifier

INTERFACE ID (64bits) : Interface Identifier

### MPLS (MultiProtocol Label Switching)

Label Exp S

Label (20bit) : Label Value. This field carries the actual value of the Label. A value of 0 represents the "IPv4 Explicit NULL Label".

A value of 1 represents the "Router Alert Label"

A value of 2 represents the "IPv6 Explicit NULL Label".

A value of 3 represents the "Implicit NULL Label"

Values 4-15 are reserved.

S (1bit) : Bottom of Stack. This bit is set to one for the last entry in the label stack

TTL (Bbit) : Time to Live. When an IP packet is first labeled the TTL field of the label stack entry is set to the value of the IP TTL field. When a label is popped, the TTL field needs to be decremented.

Exp (3bit) : Experimental Use. This three-bit field is reserved for experimental use

PSH : Push Function

SYN : Synchronize sequence numbers FIN : No more data from sender

Window (16bits) : The number of data octets beginning with the one indicated in the acknowledgment field which the sender of this segment is willing to accept.

RST · Reset the connection

Checksum (16bits) : The checksum also covers a 96 bit pseudo header conceptually prefixed to the TCP header. This pseudo header contains the Source Address, the Destination Address, the Protocol, and TCP length. This gives the TCP protection against misrouted segments. This information is carried in the Internet Protocol and is transferred across the TCP/Network interface in the arguments or results of calls by the TCP on the IP.

Urgent Pointer (16bits) : This field communicates the current value of the urgent pointer as a positive offset from the sequence number in this segment. The urgent pointer points to the sequence number of the octet following the urgent data.

## UDP (User Datagram Protocol)

Length (16bits) : This field is the length in octets of this user datagram including this header and the data. (This means the minimum value of the length is eight.)

Checksum (16bits) : The pseudo header conceptually prefixed to the UDP header contains the source address, the destination address, the protocol, and the UDP length. This information gives protection against misrouted datagrams. This checksum procedure is the same as is used in TCP.

0	15	31					
Source	e Port [	<b>Destination Port</b>					
Len	gth	Checksum					
0	15	31					
	Source Address						
D	Destination Address						
Zero	PTCL	UDP Length					

Source Address

Destination Address

Zero PTCL TCP Length

The Particular protocol of MPLS Label value determination.

#### **RSVP** (Resource reSerVation Protocol)

The RSVP protocol is used by a host to request specific qualities of service from the network for particular application data streams or flows. RSVP is also used by routers to deliver quality-of-service (QoS) requests to all nodes along the path(s) of the flows and to establish and maintain state to provide the requested service. RSVP requests will generally result in resources being reserved in each node along the data path.

#### LDP (Label Distribution Protocol)

The LDP protocol is the set of procedures and messages by which Label Switched Routers (LSRs) establish Label Switched Paths (LSPs) through a network by mapping network- layer routing information directly to data-link layer switched paths. These LSPs may have an endpoint at a directly attached neighbor (comparable to IP hop-by hop forwarding), or may have an endpoint at a network egress node, enabling switching via all intermediary nodes.

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