

## Descritivo de configuração da remota ENIU 90-30 Protocolo EGD

### 1. Materiais utilizados:

- IC693CHS391 Rack 10 Slots para PLC 90-30 (1 unidade);
- IC693NIU004 Módulo Ethernet Network Interface (1 unidade);
- IC693MDL240 Cartão Entradas Digitais 16 Pontos ( 4 unidades );
- IC693MDL930 Cartão Saída Digital 8 pontos (1 unidade);
- IC693ALG221 Cartão Entrada Analógica 4 Pontos (1 unidade);
- IC693ALG392 Cartão Saída Analógica 8 pontos (1 unidade);
- IC200CPUE05 CPU Versamax (1 unidade);
- IC200PWR102 Fonte 110/220VAC Versamax (1 unidade);
- Software Machine Edition LD PLC Versão 5.00 SP3.

### 2. Objetivo:

Estabelecer comunicação entre CPUE05 Versamax ( Controlador ) e remota 90-30 ENIU004 utilizando protocolo EGD (Ethernet Global Data).

### 3. Configuração de Hardware e Especificações:

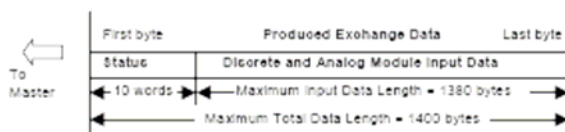
Para configurar os exchanges necessários para a comunicação entre PLC e remota, é necessário conhecer as características do protocolo EGD e da remota ENIU (Ethernet Network Interface Unit).

Abaixo segue descritivo retirado da manual GFK 2296.pdf sobre os pacotes usados na ENIU 004.

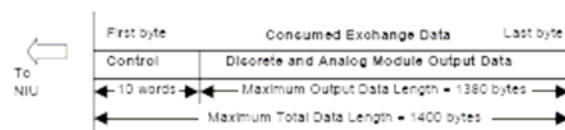
#### *EGD Exchanges*

An Ethernet NIU uses one EGD consumed data exchange and one produced data exchange. Each exchange begins with 10 words of NIU status data or CPU control data, followed by up to 1380 bytes of input or output data. The overall maximum length of a single exchange is 1400 bytes.

- The NIU's produced data exchanged consists of status data and the input data being sent to the controller.



- The NIU's consumed data exchange consists of control data and output data from the controller.



**Figura 1**

Cada exchange deve iniciar com 10 words para Status da ENIU e 10 Words para Controle.

A capacidade máxima por exchange é de **1400 bytes**.



O protocolo EGD trabalha com a filosofia de produtor e consumidor. Para melhor exemplificar este conceito, vamos utilizar os cartões do item 1.

No item 1 teremos os seguintes pontos de entradas e saídas na ENIU 004.

- 64 pontos de entradas digitais; (Estes pontos serão produzidos pela ENIU e consumidos pela CPU.)
- 4 pontos de entradas analógicas;
- 8 pontos de saídas digitais; (Estes pontos serão consumidos pela ENIU e produzidos pela CPU.)
- 8 pontos de saídas analógicas.

Para configurar os pontos de entradas, saídas, status do EGD e Status do controlador na ENIU, deveremos utilizar a tabela abaixo retirada do manual GFK 2296:

#### References Used in the Ethernet NIU

The references used by the Ethernet NIU for its I/O, status, and control data are assigned during configuration. The configuration steps are explained in chapter 4.

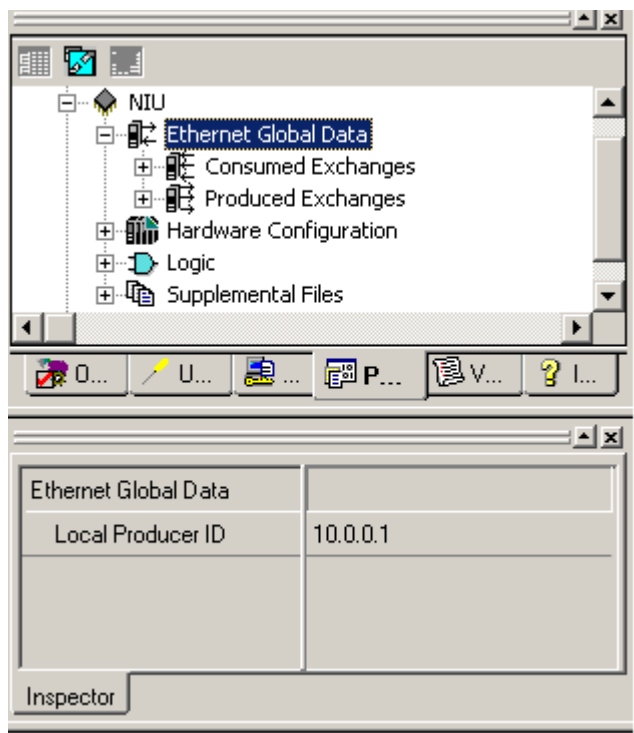
The ENIU maps data into its internal memory as shown below. *The references shown in italics for status and control data are required for correct operation.*

Type of Data	Ethernet NIU References
Discrete Inputs from field devices	%I0001 - %I2048 (bits)
Discrete Outputs from controller (primary / only)	<i>Must be %M0001 - %M2048 (bits)</i>
Discrete Outputs from optional secondary controller	<i>Must be %M2049 - %M4096 (bits)</i>
<i>Ethernet Global Data Exchange status (consumed from primary / only controller)</i>	<i>Must be %T0001 - %T0016 (bits)</i>
<i>Ethernet Global Data Exchange status (consumed from secondary controller)</i>	<i>Must be %T0017 - %T0032 (bits)</i>
<i>Ethernet Global Data Exchange status (produced by ENIU)</i>	<i>Must be %T0033 - %T0048 (bits)</i>
Analog Inputs from field devices	%A1001 - %A1512 (words)
Analog Outputs from controller (primary / only)	<i>Must be %R0001 - %R0512 (words)</i>
Analog Outputs from optional secondary controller	<i>Must be %R0513 - %R1024 (words)</i>
<i>ENIU Status data to be sent to controller(s)</i>	<i>Must be %R1101 - %R1110 (words)</i>
<i>Control Data (from primary / only controller)</i>	<i>Must be %R1111 - %R1120 (words)</i>
<i>Control Data (from secondary controller)</i>	<i>Must be %R1121 - %R1130 (words)</i>

Tabela 1

### 3.1 Configuração dos Exchanges da Remota ENIU004:

Para este exemplo configuramos o IP 10.0.0.1 conforme figura abaixo:



Então cruzando as informações dos pontos mencionados no item 1 e as referências usadas pela ENIU004, teremos as seguintes configurações no EGD na configuração de Hardware da ENIU004:

**Consumed Exchange: ConsExch1 configurado no Hardware da NIU004.**

			Length (Bytes): 37						
Add	Insert	Delete	Offset (Byt)	Variable	Ref Address	Ignore	Leng	Type	Description
			Status		%T00001	False	16	BIT	
			TimeStamp		NOT USED	False	0	BYTE	
			0.0		%M00001	False	8	BIT	
			1.0		%R00001	False	8	WORD	
			17.0		%R01111	False	10	WORD	

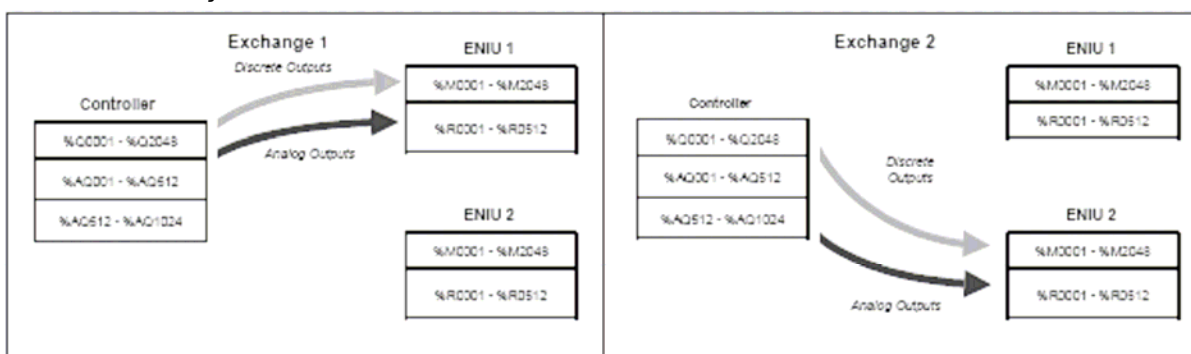
InfoViewer [0.9] IC693ALG... [0.10] IC693AL... ConsExch1 [NIU]

**Tabela 2**

- Para o status do EGD, conforme tabela 1 devemos utilizar o endereço %T0001 comprimento 16.
- Para o status do Exchange Consumido pela ENIU, devemos utilizar o endereço %R01111 comprimento 10.

- Para as saídas digitais, devemos configurar o endereço %M0001 comprimento 8.
- Para as saídas analógicas, utilizaremos a variável %R0001 comprimento 8.

Todas as informações acima descritas estão contidas na tabela 1.



**Produced Exchanges: ProdExch1 configurado no Hardware da NIU004.**

Add		Insert		Delete		Length (Bytes): 37				
Offset (Byt	Variable	Ref Address	Ignore	Leng	Type	Description				
Status		%T00033	False	16	BIT					
0.0		%R01101	N/A	10	WORD					
20.0		%I00001	N/A	64	BIT					
28.0		%AI0001	N/A	4	WORD					
36.0		%I00065	N/A	8	BIT					

InfoViewer (0.9) IC693ALG... (0.10) IC693AL... ConsExch1 [NIU] ProdExch1 [NIU]

**Tabela 3**

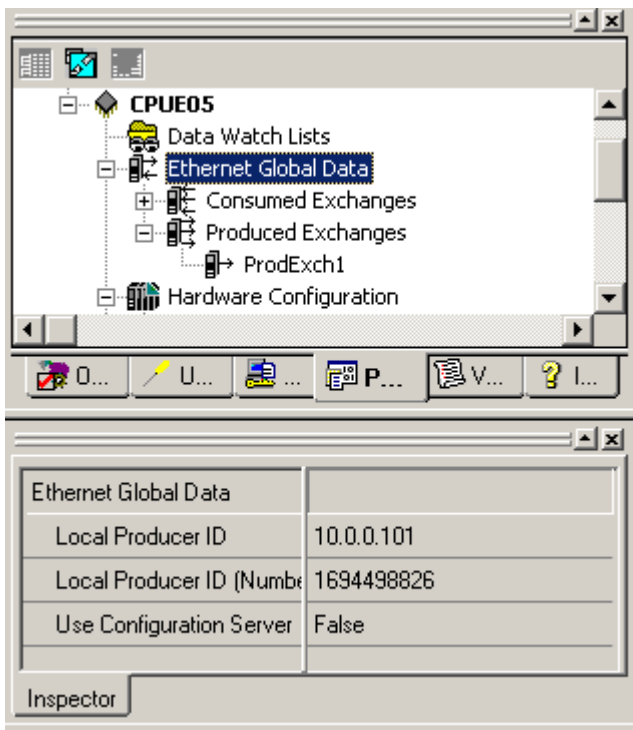
Conforme descrito acima devemos configurar o exchange produzido para a CPU da seguinte maneira:

- Para o status do exchange produzido, usaremos %T00033 comprimento 16;
- Para as palavras de controle da ENIU configuramos a variável %R01101 comprimento 10;
- Para as entradas digitais usamos os endereços configurados no Hardware Configuration, neste exemplo utilizamos a variável %I00001 comprimento 64;
- Para as entradas analógicas, %AI0001 comprimento 4;
- Para o status do cartão de saídas analógicas IC693ALG392, usaremos o %I00065 comprimento 8.

### 3.2 Configuração dos Exchanges da CPUE05 ou similar (CPU364, 374 90-30. CMM742 90-70)

Neste exemplo configuramos os exchanges recebidos e enviados pela CPU para a remota NIU004.

Para o exemplo mencionado utilizamos o IP 10.0.0.101 para a CPU Controladora como segue na figura:



#### Consumed Exchange: ConsExch1 Configurado no Hardware da CPUE05.

Abaixo segue configuração do EGD da CPUE05 com os exchanges produzidos pela NIU004 e consumidos agora na CPUE05.

Add    Insert    Delete    Length (Bytes): 37						
Offset (Byte)	Variable	Ref Address	Ignore	Length	Type	Description
Status		%R00002	False	1	WORD	
TimeStamp		NOT USED	False	0	BYTE	
0.0		%R00013	False	10	WORD	
20.0		%I00001	False	64	BIT	
28.0		%A10001	False	4	WORD	
36.0		%I00065	False	8	BIT	

InfoViewer    ConsExch1 [NIU]    ConsExch1 [Tar...]

**Produced Exchanges: ProdExch1 configurado no Hardware da NIU004.**

Abaixo segue configuração do EGD da CPUE05 com os exchanges consumidos pela NIU004 e produzidos agora pela CPUE05.

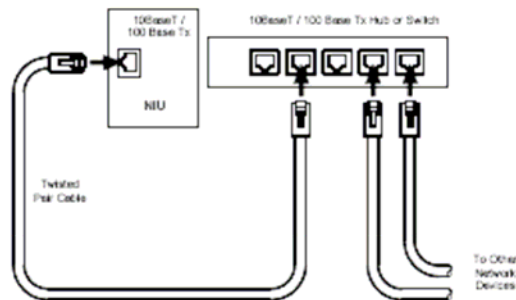
Add		Insert		Delete		Length (Bytes): 37	
Offset (Byte.	Variable	Ref Address	Ignore	Lengt	Type	Description	
Status		%R00001	False	1	WORD		
0.0		%Q00001	N/A	8	BIT		
1.0		%AQ0001	N/A	8	WORD		
17.0		%R00003	N/A	10	WORD		

InfoViewer ProdExch1 [Tar...

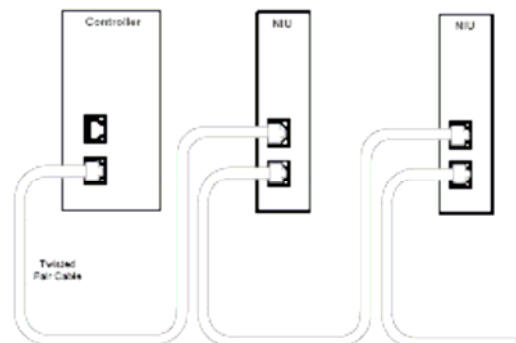
Com todas as configurações realizadas, agora precisamos conectar os cabos entre a remota NIU004 e a CPUE05 como na figura abaixo:

*Network Connections*

Connection of the Ethernet Interface to a 10Base-T or 100Base-TX network via a hub or switch is shown below (each cable drop can be up to 100 meters long):



Connection between a controller Ethernet port and one or more Ethernet NIUs can also be made directly. In this type of installation, loss of power on any NIU breaks the communications link to all units that follow the unit without power.



Com todos os passos seguidos e as conexões realizadas, verificaremos nas Words de status, configurados na CPU Controladora, o valor 1. Estas words serão respectivamente os endereços %R0001 e %R0002.

Abaixo segue tabela para diagnóstico dos exchanges trocados.

The following table shows the error codes that can be written to the Exchange Status word.

**Table 4-3. Exchange Status Word Error Codes**

Value (Decimal)	P – Produced/ C – Consumed	Description
0	P/C	<b>No new status event has occurred.</b> Produced: Initial value until the first producer period refresh occurs. Consumed: The data has not been refreshed since the previous consumption scan and the consumer timeout has not expired.
1	P	<b>No error currently exists.</b> The exchange is producing data.
1	C	<b>No error, data consumed.</b> The data has been refreshed on schedule since the previous consumption.
3	C	<b>SNTP error.</b> The Ethernet Interface in the producer is configured for network time synchronization, but is not synchronized to an SNTP server. The data has been refreshed on schedule.
4	P/C	<b>Specification error.</b> Produced: During exchange configuration*, an invalid configuration parameter was received by the Ethernet Interface or an error occurred in communication with the PLC CPU. Consumed: Same as Produced, or the size of a received packet for this exchange definition did not match the expected size.

\* Exchange configuration occurs when either 1) Hardware Configuration containing EGD is stored to the PLC, 2) a PLC containing EGD configuration powers up, or 3) an Ethernet Interface configured for EGD is restarted.

Table 4-3. Exchange Status Word Error Codes - Continued

Value (Decimal)	P – Produced/ C – Consumed	Description
6	C	<b>Refresh timeout without data.</b> The exchange's timeout period is configured to a non-zero value and the data has not been refreshed within the timeout period.
7	C	<b>Data after refresh timeout.</b> The data has been refreshed since the previous consumption, but was not refreshed within the timeout period.
10	P/C	<b>IP Layer not currently initialized.</b> This status can be set during exchange configuration* if the Ethernet Interface detects that it cannot currently access a network (cable not connected, hardware failure, etc.) This is a temporary status which may change if successful network access becomes possible.
12	P/C	<b>Lack of resource error.</b> Local resources are not available to establish the exchange. This error can only occur during exchange configuration*. The PLC Fault Table should be examined to obtain more detail on the specific error.
16	P	<b>Name Resolution in progress.</b> A local produced exchange definition has specified a name for the consumer address and the local Ethernet Interface is awaiting a response from a remote name server following exchange configuration*. This is a temporary status that will change when the name resolution completes. If successful, the status will become 0 (No New Data); if unsuccessful, the status will become 4 (Specification Error).
18	P/C	<b>Loss of Ethernet Interface error.</b> This error can occur if the CPU no longer recognizes the Ethernet Interface within the PLC rack. A loss of module PLC Fault Table entry will also be present. The error can also occur if the module in the given slot of the PLC rack does not match the module specified in the configuration (configuration mismatch).
22	P/C	<b>Ethernet Interface does not support EGD.</b> The revision level of the Ethernet Interface does not support global data.
26	P/C	<b>No Response from Ethernet Interface.</b> Did not respond to establish exchange request. This fault can only occur during exchange configuration*.
28	P/C	<b>Failed to create an exchange.</b> An error occurred (other than a resource error, no response or loss of Ethernet Interface) during exchange configuration*. A PLC Fault Table entry is provided for additional information about the fault.

\* Exchange configuration occurs when either 1) Hardware Configuration containing EGD is stored to the PLC, 2) a PLC containing EGD configuration powers up, or 3) an Ethernet Interface configured for EGD is restarted.

#### **4.0 Manuais Consultados**

*TCP/IP Ethernet Communications for the Series 90 PLC GFK-1541A;  
Series 90-30 Programmable Controller Ethernet NIU User's Manual GFK-2296*

<http://www.geindustrial.com/cwc/gefanuc/support/plcio.htm?SMIDENTITY=NO>