



IT900

Parameter Configuration

Recommendations

Application Note

February 2010

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Table of Contents

IT900.....	1
PARAMETER CONFIGURATION RECOMMENDATIONS.....	1
TABLE OF CONTENTS.....	2
TABLE OF FIGURES.....	3
1. INTRODUCTION.....	4
2. CONFIGURATION RECOMMENDATION GUIDELINES	4
3. CONFIGURATION RECOMMENDATIONS VS. PERFORMANCE IMPLICATIONS.....	5
3.1 THE 'CONFIGURABLE PARAMETERS' MENU.....	5
3.2 THE 'NL MANAGER CONFIGURATION' MENU	6
3.3 AUTOMATIC CONFIGURATION.....	8
3.3.1 <i>Configurations Dependent Only on Regional Setting</i>	8
3.3.2 <i>Automatic Configuration process</i>	8
3.3.2.1. Automatic Regional Settings.....	8
3.3.2.2. Automatic Network Size Settings	8
3.4 EXPECTED PERFORMANCE	9

Table of Figures

Figure 1:The PLC Studio Main Screen	5
Figure 2:The Configurable Parameters Menu	5
Figure 3: NL Configuration Dialog of Remote Sation (RS)	6
Figure 4: NL Configuration Dialog of Base Sation (NC)	7
Figure 5: DLL Parameter Settings	8
Figure 6: Expected Performance	9

1. Introduction

This document provides guidelines for configuring IT900 Network Layer (NL) parameters. The recommendations provided are based on network size and regional settings (different NL Parameters are set automatically according to Network Size configurable parameter) as configuration affects the Network Layer expected performance.

The recommendations detailed herein are provided through PLC Studio menus and should be used as reference only. Some network profiles may warrant modification to the configuration guidelines provided in this document. Therefore, where the below recommendation does not provide adequate performance it is advised to contact Yitran's Customer Support team for further assistance.

2. Configuration Recommendation Guidelines

The recommendations in Section 3 are relevant for a network at its steady state, utilizing the channel with no more than 15% of its capacity with NL management packets (given the network size and regional settings). However, during the network setup stages the utilization required may be greater. Therefore, it is not recommended to decrease the suggested timing configurations as this may cause network instability and channel congestion. Increasing the timing configurations is allowed but will result in reduced NL overhead at the expense of lowering the NL performance.

3. Configuration Recommendations vs. Performance Implications

3.1 The 'Configurable Parameters' Menu

From the *Main Studio* screen, select the *Node Configuration* option and then the *System Parameters* menu (see Figure 1). Verify that the parameters are set according to recommendations in the 'Configurable Parameters' screen (see Figure 2)

Figure 1: The PLC Studio Main Screen

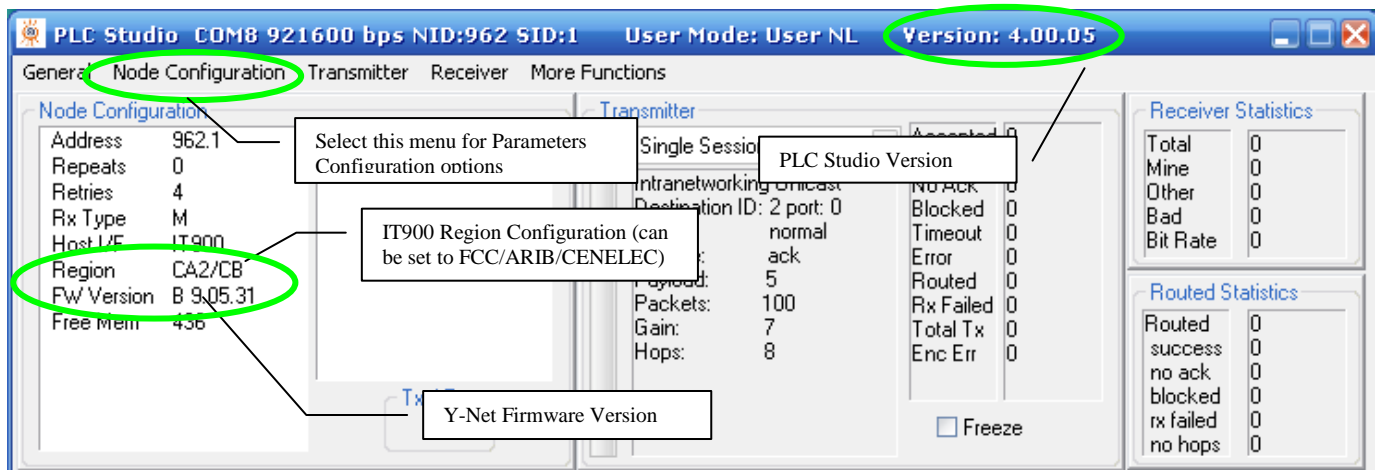
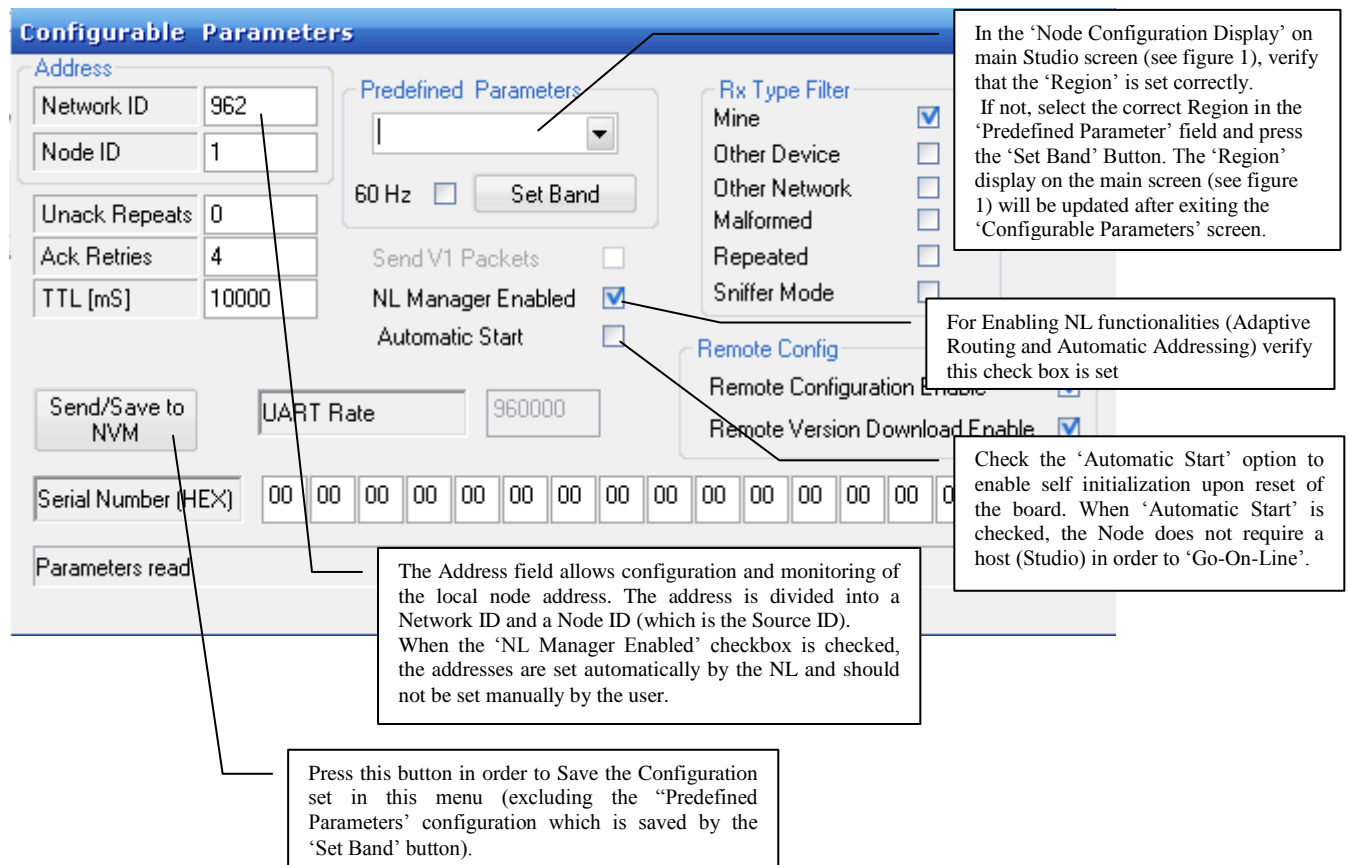


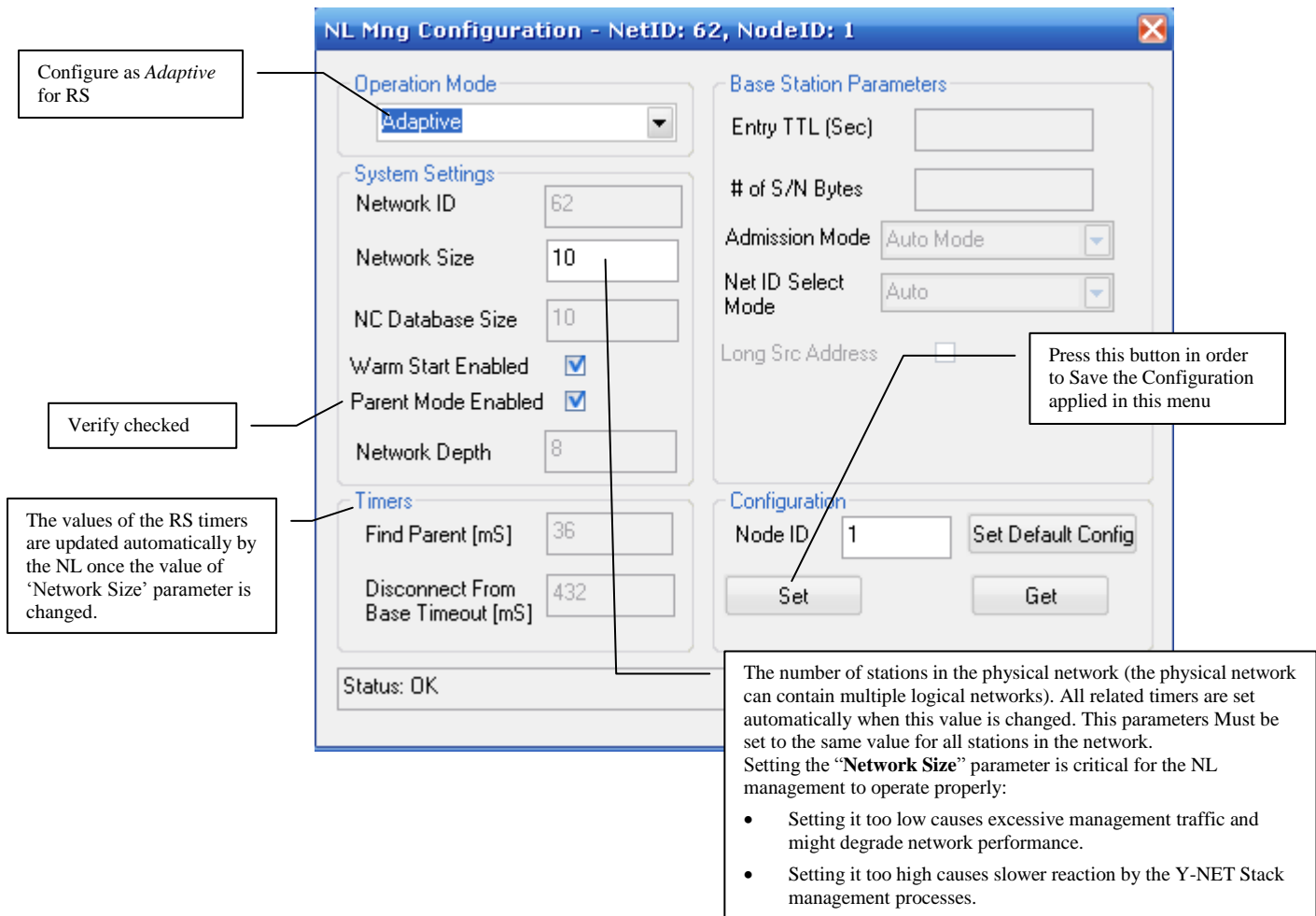
Figure 2: The Configurable Parameters Menu



3.2 The 'NL Manager Configuration' Menu

From the Main Studio screen, select the Node Configuration option (see Figure 2) and then the NL Manager menu. Click on the Configuration button in the NL Manager screen and the NL Configuration dialog will appear. Verify that the parameters are set according to recommendations detailed in Figure 3 (for RS) and Figure 4 (for NC).

Figure 3: NL Configuration Dialog of Remote Station (RS)



Configure as Adaptive for RS

Verify checked

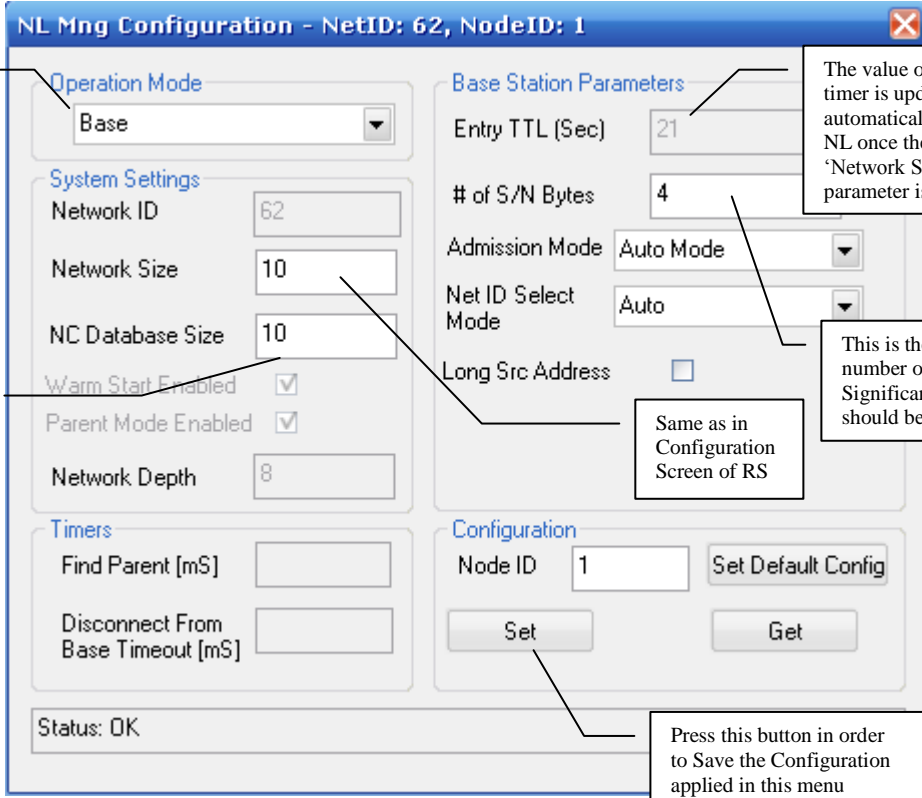
The values of the RS timers are updated automatically by the NL once the value of 'Network Size' parameter is changed.

Press this button in order to Save the Configuration applied in this menu

The number of stations in the physical network (the physical network can contain multiple logical networks). All related timers are set automatically when this value is changed. This parameters Must be set to the same value for all stations in the network. Setting the "Network Size" parameter is critical for the NL management to operate properly:

- Setting it too low causes excessive management traffic and might degrade network performance.
- Setting it too high causes slower reaction by the Y-NET Stack management processes.

Figure 4: NL Configuration Dialog of Base Station (NC)



Operation Mode
Base

System Settings
Network ID: 62
Network Size: 10
NC Database Size: 10
Warm Start Enabled: ☒
Parent Mode Enabled: ☒
Network Depth: 8

Timers
Find Parent [mS]:
Disconnect From Base Timeout [mS]:

Base Station Parameters
Entry TTL (Sec): 21
of S/N Bytes: 4
Admission Mode: Auto Mode
Net ID Select Mode: Auto
Long Src Address: ☐

Configuration
Node ID: 1
Set Default Config
Set
Get

Status: OK

Configure as *Base* for NC (Network Concentrator)

Set the "NC Database Size" parameter to the Maximal number of RS that are allowed to join the network. The NC will define it databases size according to this parameter.

The value of this NC timer is updated automatically by the NL once the value of 'Network Size' parameter is changed.

This is the minimum number of S/N Least Significant Bytes that should be unique

Same as in Configuration Screen of RS

Press this button in order to Save the Configuration applied in this menu

3.3 Automatic Configuration

The following section details the values of parameters that are configured automatically according to Regional Settings (FCC/ARIB/CA/CB) and Network Size.

3.3.1 Configurations Dependent Only on Regional Setting

The IT900 TTL parameter is set for both NC and RS in accordance with the regional setting used as specified in the Figure below (regardless of the network size):

Figure 5: DLL Parameter Settings

DLL Parameter	FCC	ARIB	CB/CA/CA2
TTL[mS]	5 sec	7.5 sec	10 sec

3.3.2 Automatic Configuration process

3.3.2.1. Automatic Regional Settings

To automatically configure RS/NC parameters according the regional settings, follow the procedure below:

1. Enter to the 'Configurable Parameters' menu (see Figure 2)
2. In the 'Predefined Parameters' field, select the appropriate region (the region is defined according to the IT900 AFE).
3. Click the 'Set Band' button.
4. After exiting the 'Parameters' menu, the regional settings will be set.

3.3.2.2. Automatic Network Size Settings

To automatically configure RS/NC parameters according to the Network Size, follow the procedure below:

1. Enter to the 'NL Mng Configuration' menu (see Figure 4).
2. Set number of nodes (in the physical network) in the 'Network Size' field.
3. Click the 'Set' button.
4. The NL configuration will be automatically set according to the Network Size.

3.4 Expected Performance

The typical expected performance due to the above configurations in accordance with the network size and regional settings specified are detailed in the Figure below:

Figure 6: Expected Performance

FCC				
# RS	Complete net formation time	Connection to net time (of Single RS)	Link Recovery Time (by RS)	Disconnect from net time (by NC)
20	~1.5 minutes	~20 seconds	~2 minutes	~13 minutes
50	~3 minutes	~20 seconds	~5 minutes	~37 minutes
200	~10 minutes	~20 seconds	~18 minutes	~2.5 hours
500	~20 minutes	~20 seconds	~45 minutes	~6.25 hours

ARIB				
# RS	Complete net formation time	Connection to net time (of Single RS)	Link Recovery Time (by RS)	Disconnect from net time (by NC)
20	~2.5 minutes	~30 seconds	~3 minutes	~19 minutes
50	~4.5 minutes	~30 seconds	~7.5 minutes	~61 minutes
200	~15 minutes	~30 seconds	~27 minutes	~3.75 hours
500	~30 minutes	~30 seconds	~1 hour	~9.25 hours

CA/CA3/CB				
# RS	Complete net formation time	Connection to net time (of Single RS)	Link Recovery Time (by RS)	Disconnect from net time (by NC)
20	~3 minutes	~40 seconds	~4 minutes	~26 minutes
50	~9 minutes	~40 seconds	~10 minutes	~74 minutes
200	~20 minutes	~40 seconds	~36 minutes	~5 hours
500	~40 minutes	~40 seconds	~1.5 hours	~12.25 hours

CA2				
# RS	Complete net formation time	Connection to net time (of Single RS)	Link Recovery Time (by RS)	Disconnect from net time (by NC)
20	~4 minutes	~53 seconds	~ 5.3 minutes	~ 35 minutes
50	~12 minutes	~53 seconds	~13 minutes	~ 99 minutes
200	~ 27 minutes	~53 seconds	~ 48 minutes	~6.6 hours
500	~53 minutes	~53 seconds	~ 2 hours	~ 16.3 hours

Expected Performance Notes:

1. **#RS** – The expected number of remote stations in the network.
2. **Complete net formation time** – The time it takes all RS in the network to connect to the NC. The indicated connection to net time depends on the topology and maximum distance from NC.
3. **Connection to net time** - The average time it takes a new station to connect to an existing network with all RS already connected to NC.
4. **Link Recovery Time (by RS)** - The average time it takes an RS to recover from a link failures and search for an alternative route to the NC. When the RS finds an alternate path it will reconnect to the NC.
5. **Disconnect from net time (by NC)** - The average time it takes the NC to identify that an RS is disconnected and has no alternative route to the NC. When the RS finds an alternate path it will reconnect to the NC. If the RS does not find an alternate path to reconnect, the NC will delete it from the ARA topology tree.
6. The channel utilization due to these configurations is no more than 15% at the steady state.

Document Control

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1.0	February 2011	Creation

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