



Wireless Digital Concentrator

(NDC-I632)

Product Description

Revision 1.0



NDC-I632 Product Description

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NURI Telecom Co., Ltd.

Nuri Bld, 750-14, Bangbae-dong, Seocho-gu, Seoul, Korea, 137-060

Tel: (02) 781-0777

Fax: (02) 781-0704

E-mail: aimiradm@nuritelecom.com

Website: <http://www.nuritelecom.com>

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NDC-I632 Product Description

1. Overview

The NDC-I632 DCU is a Wireless Digital Concentrator applied with wireless technology (Wi-Fi), and G3 PLC technology. It collects and saves data, including metering data, executes the commands from sensor by analyzing the commands from server by transferring this data to the relevant server (FEP: Front End Process) over the pre-defined Protocols.

This guide is based on the NDC-I632 DCU Hardware and describes its features, configurations, connections and operations.

1.1 Main Feature and Characteristics

- Support of various communication interfaces including Wi-Fi, PLC, LAN, Serial
- Support of Console Serial Port
- Support of External Management Ethernet Port (10/100/1000Mbps)
- Manage and control of up to 100 slave PLC Modems/Meters
- Various Application Server Connections
- Self-diagnostics for Power, Temperature, and Operation status of each communication Interface.
- Operation/management when the power goes off (equipped with Li-ion Battery) and Power-off notification to Server.
- Remote settings and controls for the NDC-I632 DCU and PLC Modems/Meters.

1.2 Product Applications

- AMR System
- Home Network System
- Speedline[™] Service System
- Other Remote AMR and Control System

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1.3 Appearance

- Front



[Fig. 1-1] Front

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2. Hardware Specification

2.1 General Specification

Item	Description
Processor	ARM Cortex-A8 32Bits RISC Processor
Memory	DDR2 512MB
	FLASH 1GB, Serial Flash 16MB
Interface	LAN/10,100,1000M bps, RS-232(Console)
Wi-Fi Interface	Async logic level
Wi-Fi Antenna	Antenna Type: 3.5dBi Helical Structure
	Connector Type: Chip-type Internal Antenna or U.FL(Ext. Ant.)
PLC Interface	G3 PLC(154 ~ 487KHz)
PLC Output / Sensitivity	120dB μ V / 29dB μ V
PLC Modulation	OFDM
Operating Temperature / Humidity	-40℃ ~ +70℃ / 10% ~ 95%
Storage Temperature / Humidity	-40℃ ~ +80℃ / 10% ~ 95%
Power Consumption @ 3-Phase AC 380V/60Hz	Normal Operation: 6 W
	Charging state: Max 12W (Charge Current : 350mAh)
Back up Battery	Rechargeable Li-Ion Battery 3.7V(5200mAh)
RoHS	Comply
Weight (g)	900
Size (mm)	256(L) X 130(W) X 75(D), not include Antenna
AC Main Input	3-Phase / 400V3N~, 50/ 60 Hz $\pm$ 3Hz, 0.5A
Quality of the material	PC+ABS/UL94-V0

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2.2 Wi-Fi Interface Specification

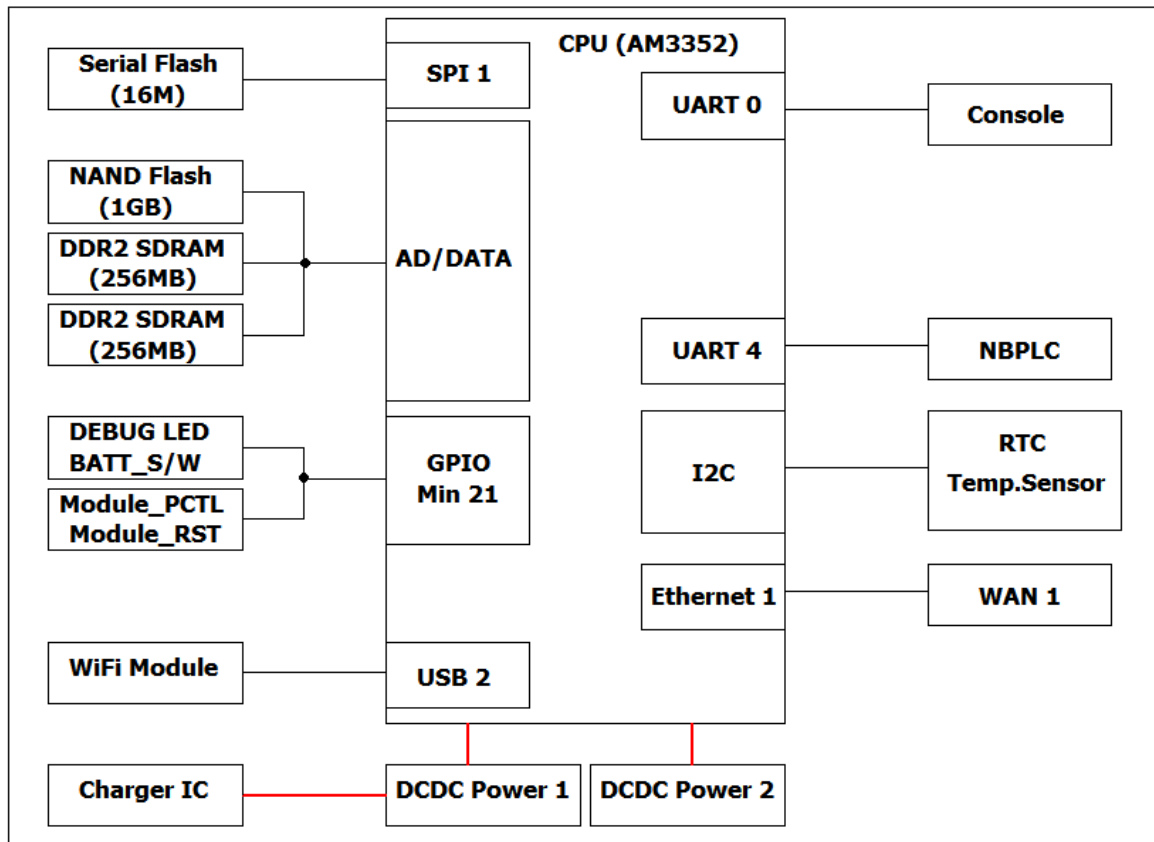
Item	Description
Frequency Range	2.4 ~ 2.4835 GHz
RF Certification	ETIS EN 303 204
RF Radiated Output(E.R.P)	Max. 11 dBm
Receive Sensitivity	Below -88 dBm
RF Standard	IEEE 802.11b IEEE 802.11g IEEE 802.11n
Antenna Interface	Antenna Type : 3.5dBi Helical Structure Chip Antenna

PLC Interface Specification

Item	Description
PLC Interface	G3 PLC
Frequency Range	154 ~ 487 KHz
TX Output	120dB μ V
RX Sensitivity	29dB μ V
PLC Modulation	OFDM

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2.4 Block diagram



2.5 General description (Block diagram)

1) Serial flash (W25Q128FV)

- Serial Flash storage: 128Mbit(16Mbyte)
- Boot program storage
- Serial flash Interface: Serial Peripheral interface(SPI)
 - * CPU to Serial flash

2) NAND Flash (29F8G08ABACA)

- NAND Flash storage: 1GByte
- Application Program storage & data back up
- interface: 8bit data bus

3) DDR2 SDRAM (W972GG8JB)

- Memory: 2Gbit * 2

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- This device achieves high speed transfer rates up to 1066Mb/sec for general Application.

4) debug LED

- Main board status display

5) BATT S/W

- Back up Battery On/Off Switch

6) Wi-Fi Module (TW88EUM3W-SB)

- Frequency: 2400MHz ~ 2483.5MHz
- Channel: 14 Ch
- RF Standard: IEEE 802.11g
IEEE 802.11g
IEEE 802.11n

7) PLC Module (ST8500)

- Frequency: Use 154KHz ~ 487KHz

8) RTC & Temp. sensor

- The RV-3029-C3 is an ultra miniature Real-Time-Clock Module with embedded Crystal. This RTC has an I2C Bus (2-wire Serial-Interface) and offers temperature compensated time. The STC-Smart Temperature Compensation is calibrated in the factory and leads to a very high time-accuracy of ± 6 ppm from -40°C to $+85^{\circ}\text{C}$ and ± 8 ppm from -40°C to $+125^{\circ}\text{C}$.

9) LAN

- 10/100/1000 Mbps Speed
- Program download Port

10) Charger IC (MP2604DQ)

- The MP2604 is a linear, high-performance single cell Li-Ion battery charger. By integrating high voltage input protection into the charger IC, the MP2604 can tolerate an input surge up to 28V.
- The device features constant current (CC) and constant voltage (CV) charging modes with programmable charge currents (85mA to 1A), programmable battery full threshold, thermal protection, battery temperature monitoring and reverse current blocking. The device also provides AC adapter power good and charge status indications to the system.

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11) DCDC (MP2143)

- The MP2143 is a monolithic, step-down, switch mode converter with internal power MOSFETs. It can achieve up to 3A continuous output current from a 2.5V-to-5.5V input voltage with excellent load and line regulation. The output voltage can be regulated as low as 0.6V.
- Constant-on-time control provides fast transient response and eases loop stabilization. Fault condition protections include cycle-by-cycle current limiting and thermal shutdown.

12) Crystal

- CPU: 24MHz
- Ethernet: 25MHz

13) SMPS

- Power supply
- AC input: 88 – 264V, 50/60Hz ± 3 Hz
- DC Output: 6V, 3A

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3. External Interface & Status Display

3.1 Front LED

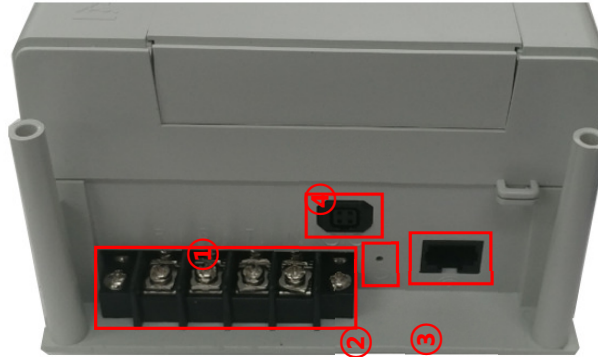


Item	LED	Explanation
Power	PWR	Green On – Power is being supplied
SATUS	SAT	Green On – Operating status is OK
Battery	BAT	GREEN On – Battery low
		GREEN Off – Battery normal
RF Link	RFC	GREEN On – RF Network link
REMOTE	MDC	GREEN On/Off – Mobile data Communication (Not Used)
LAN	ETH	GREEN On/Off – Data Communication Over Ethernet Network
PLC	PLC	GREEN On/Off – Data Communication Over PLC Network

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3.2 Bottom Interface

There are Connector and NDC-I632 Reset Switch that can connect AC Power Cable to Bottom Interface and there are LAN Port and Console Port so that can do Interface with External Device.



Name	Explanation
3-Phase / 400V	AC Power Cable Connector (3-Phase)
RESET	Reset Switch
LAN	Ethernet Port (10/100/1000Mbps)
Console	Serial Port Console

3.3 Console Cable



Number	Name	Explanation
2	TXD	Transmitted Data Signal
3	RXD	Received Data Signal
5	GND	Signal Ground

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4. Operation

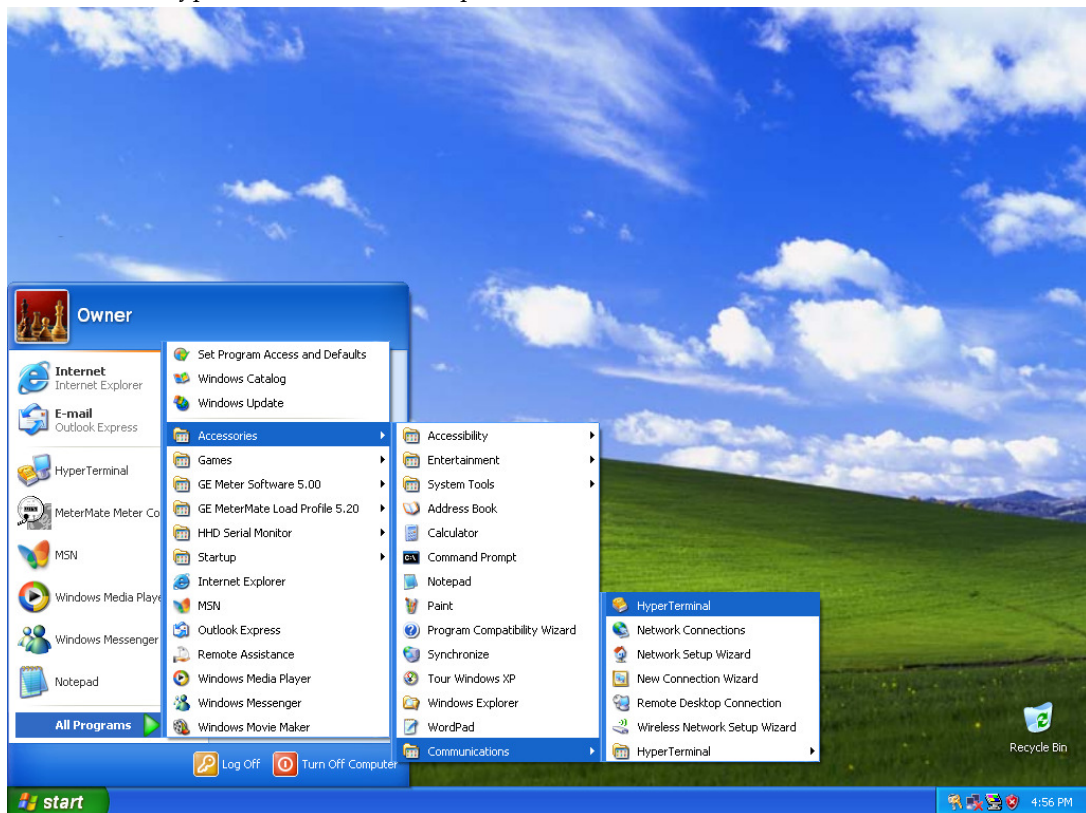
4.1 Console (Serial) Connections and Operations

4.1.1 Serial Console Cable Connections

Connect CONSOLE side DB9 Port with Serial Port of PC after connect Interface Cable.

4.1.2 HyperTerminal Setting

Execute HyperTerminal of PC with picture below.



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4.1.3 New regulation connection name storage

Input name that is stored in new connection with lower part picture, and click OK Button.



4.1.4 Serial Port selection

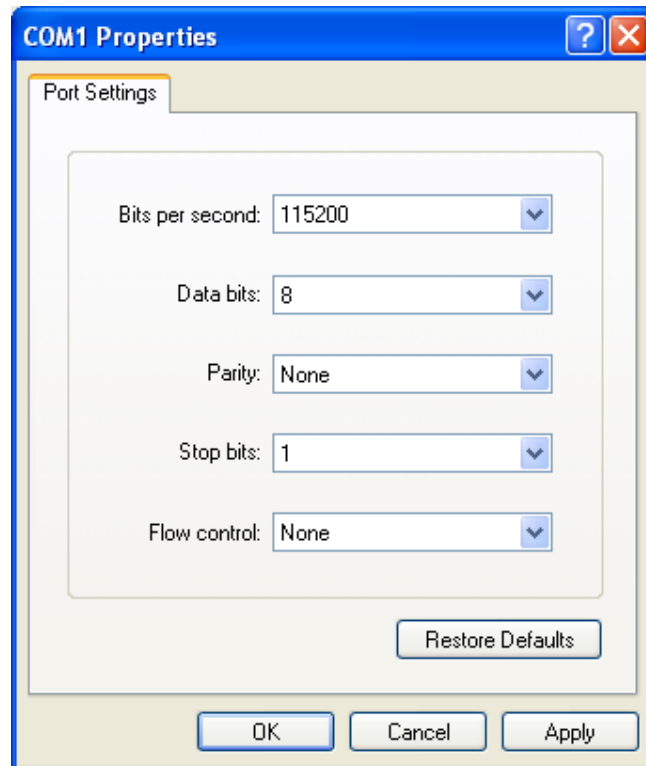
Under Serial Port selection with picture with NDC-I632 Serial Port number of coupled PC after selection OK button click.



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4.1.5 Serial Port Setting

Click OK button after establish by 115200 bps, 8 Data bits, None Parity, 1 Stop bit, None Flow control as is appeared in picture below. If is ended to all this processes, HyperTerminal is executed normally.



4.1.6 NDC-I632 Booting message confirmation

```
Welcome NDC Bootloader v2.0
Boot Flash Check .....
Detect AM29LV400 (TOP)Flash : 22B9
NAND Chip Check .....
Kernel, Ramdisk Bad Block [0]
CS8900 Init.....
Mac Address   : [00 A2 55 F2 63 25]
Quickly Autoboot [ENTER] / Goto BOOT-MENU press [space bar]...
```

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```
Copy Kernel Image .....
Copy Ramdisk Image .....
Starting kernel [MARCH 303]...
Uncompressing Linux..... done, booting the kernel.
Linux version 2.4.19-rmk7-pxa1 (gcc version 3.2.1) #470 2015. 04. 26. (Thu) 13:47:51 KST
CPU: TI3352 cortex A8
Machine: NDC-I632
Ignoring unrecognised tag 0x00000000
Memory clock: 99.53MHz (*27)
Run Mode clock: 99.53MHz (*1)
Turbo Mode clock: 298.60MHz (*3.0, active)
On node 0 totalpages: 16384
zone(0): 16384 pages.
zone(1): 0 pages.
zone(2): 0 pages.
Kernel command line: y   initrd=0xa0800000,5M root=/dev/ram ramdisk=16384 console=ttyS02,115200
USERBOOT ip0=187.1.20.6 nandparts=1,5,58
Calibrating delay loop... 298.18 BogoMIPS
Memory: 64MB = 64MB total
Memory: 58132KB available (1234K code, 254K data, 48K init)
Dentry cache hash table entries: 8192 (order: 4, 65536 bytes)
Inode cache hash table entries: 4096 (order: 3, 32768 bytes)
Mount-cache hash table entries: 1024 (order: 1, 8192 bytes)
Buffer-cache hash table entries: 4096 (order: 2, 16384 bytes)
Page-cache hash table entries: 16384 (order: 4, 65536 bytes)
POSIX conformance testing by UNIFIX
Linux NET4.0 for Linux 2.4
Based upon Swansea University Computer Society NET3.039
Initializing RT netlink socket
Using TI3352 frequency points.
Registering CPU frequency change support.
CPU clock: 500 MHz (99.000-600.000 MHz)
Starting kswapd
I2C: TI algorithm module loaded.
I2C: Adding PXA-I2C-Adapter.
i2c-dev.o: Registered 'TI3352-I2C-Adapter' as minor 0
```

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```
I2C: Scanning bus (48)(68)
I2C: Successfully added bus
pty: 256 Unix98 ptys configured
Serial driver version 5.05c (2001-07-08) with no serial options enabled
ttyS00 at 0x0000 (irq = 15) is a TI UART
ttyS01 at 0x0000 (irq = 14) is a TI UART
ttyS02 at 0x0000 (irq = 13) is a TI UART
ttyS03 at 0x0000 (irq = 0) is a TI UART
ttyS04 at 0xf3000000 (irq = 30) is a 16550A
I2C: DS1340 RTC driver successfully loaded
lm75.o version 2.8.5 (20040305)
eth0: cs8900 rev K Base 0xF2000300<6>, IRQ 44, MAC 00:A2:55:F2:63:25
RAMDISK driver initialized: 16 RAM disks of 16384K size 1024 blocksize
loop: loaded (max 8 devices)
PPP generic driver version 2.4.2
PPP BSD Compression module registered
NAND device: Manufacture ID: 0xec, Chip ID: 0x76 (Samsung NAND 1GB 3,3V)
Creating 3 MTD partitions on "NAND 1GB 3,3V":
0x00000000-0x00100000 : "NAND Kernel partition"
0x00100000-0x00600000 : "NAND Ramdisk partition"
0x00600000-0x04000000 : "NAND Data partition 0"
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP, IGMP
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 4096 bind 8192)
Linux IP multicast router 0.06 plus PIM-SM
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
NetWinder Floating Point Emulator V0.95 (c) 1998-1999 Rebel.com
RAMDISK: Compressed image found at block 0
Freeing initrd memory: 5120K
VFS: Mounted root (ext2 filesystem) readonly.
Freeing init memory: 48K
-bash: /home/mcuinstall: No such file or directory
```

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5. ETC.

5.1 LABEL



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6. Notice

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment should be installed and operated with minimum distance 20 cm (7.8 inches) between the antenna and your body. Users must follow the specific operating instructions for satisfying RF exposure compliance.