Ref : RF_TN_009 V1.1

TECHNICAL NOTE

BeanGateway® management on a LAN infrastructure

Beanair – 1, mail Gay Lussac - 95000 Neuville-sur-Oise – France

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Contents

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2. DEFINITION OF SYMBOLS

Symbol	*Definitions*
	***Handling / configuration can cause a degraded mode of operation of the product.*** ***This manipulation / configuration are not dangerous for the product or the user.***
	***Handling / configuration can cause an irreversible failure of the product.***
	***Important information for optimizing the operation of the wireless measurement equipment.***

3. ABREVIATIONS

WSN : Wireless Sensor Network

4. AIM OF THIS DOCUMENT

The aim of this document is to describe closely all the parameters related to the LAN configuration of your BeanGateway®.

5. SOME DEFINITIONS

5.1 WHAT IS A DNS?

The DNS Domain Name System is a database system that translates the BeanGateway®'s fully qualified domain name into an IP address.

The BeanGateway® uses IP addresses to locate and be located in order to communicate. However IP addresses can be difficult to remember. For example, while browsing the web it is much easier to remember domain names such www.benair.com rather than its associated IP address (207.171.166.48). The DNS allows you to manage a BeanGateway® on your Network by using its user-friendly domain name rather than its numerical IP address. Conversely, Reverse DNS (rDNS) translates an IP address into a domain name.

Each organization that maintains a computer network will have at least one server handling DNS query. The name server, will hold a list of all the IP addresses within its network, plus a cache of all IP addresses for recently accessed computers outside the network. Each computer on each network needs to know the location of only one name server. When your BeanGateway® requests an IP address, one of the three following cases may happen, depending on whether or not the requested IP address is within your local network:

- If the requested IP address is registered locally (i.e., it's within your organization's network), you' will receive a response directly from one of the local name servers listed in your workstation configuration. In this case, there usually is little or no wait for a response.

- If the requested IP address is not registered locally (i.e., outside your organization's network), but someone within your organization has recently requested the same IP address, then the local name server will retrieve the IP address from its cache. Again, there should be little or no wait for a response.

- If the requested IP address is not registered locally, and you are the first person to request information about this system in a certain period of time (ranging from 12 hours to one week), then the local name server will perform a search on behalf of your workstation. This search may involve querying two or more other name servers at potentially very remote locations. These queries can take anywhere from a second or two up to a minute (depending on how well connected you are to the remote network and how many intermediate name servers must be contacted). Sometimes, due to the lightweight protocol used for DNS, you may not receive a response. In these cases, your workstation or client software may continue to repeat the query until a response is received, or you may receive an error message.

A good analogy is to think of DNS as an electronic telephone book for a BeanGateway® on your network. If you know the name of the BeanGateway® in question, the name server will look up its IP address.

5.2 WHAT IS DHCP ?

Dynamic Host Configuration Protocol (DHCP) is a network protocol that enables a server to automatically assign an IP address to a computer from a defined range of numbers (i.e., a scope) configured for a given network.

DHCP assigns an IP address whenever the BeanGateway® is started, for example:

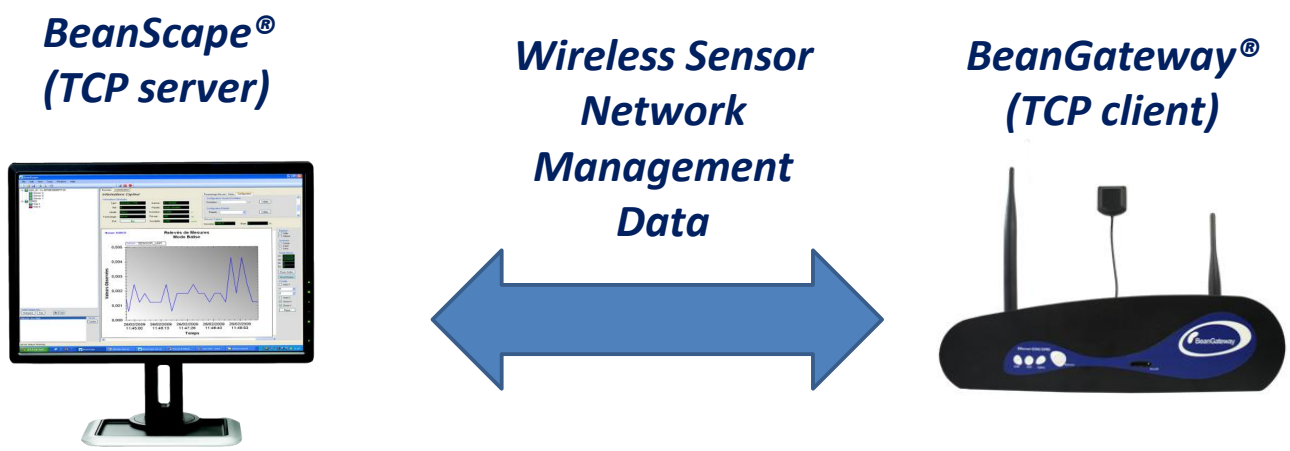
1. A user turns on the BeanGateway® with DHCP client activated.
2. The BeanGateway® sends a broadcast request (called a DISCOVER or DHCPDISCOVER), looking for a DHCP server to answer.
3. The router directs the DISCOVER packet to the correct DHCP server.
4. The server receives the DISCOVER packet. Based on availability and usage policies set on the server, the server determines an appropriate address (if any) to give to the client. The server then temporarily reserves that address for the client and sends back to the client an OFFER (or DHCPOFFER) packet, with that address information. The server also configures the client's DNS servers, NTP servers, and sometimes other services as well.
5. The client sends a REQUEST (or DHCPREQUEST) packet, letting the server know that it intends to use the address.
6. The server sends an ACK (or DHCPACK) packet, confirming that the client has been given a lease on the address for a server-specified period of time.

When a BeanGateway® uses a static IP address, it means that the BeanGateway® is manually configured to use a specific IP address. One problem with static assignment, which can result from user error or inattention to detail, occurs when two BeanGateway® are configured with the same IP address. This creates a conflict that results in loss of service. Using DHCP to dynamically assign IP addresses minimizes these conflicts.

6. BEANSCAPE® AND BEANGATEWAY® COMMUNICATION MECHANISMS OVERVIEW

6.1 REGULAR COMMUNICATION : TCP LINK

6.1.1 LAN overview

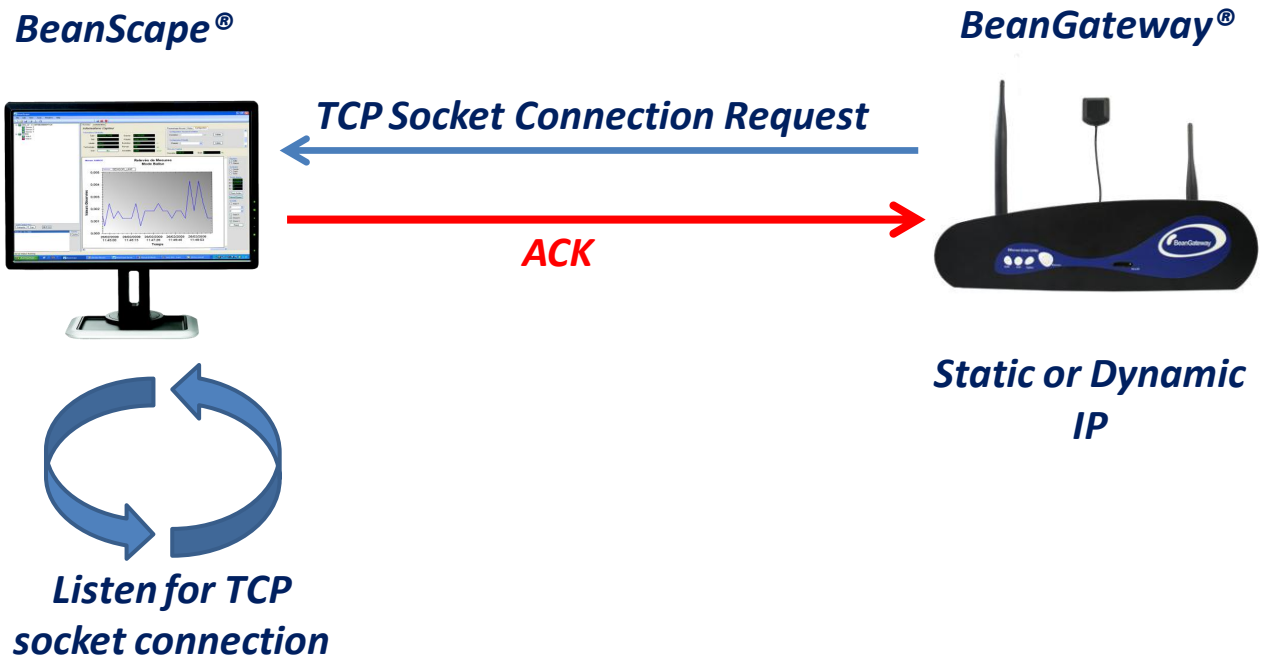


PC/BeanScape® IP Address must be known by the BeanGateway®

6.1.2 Initiating connection

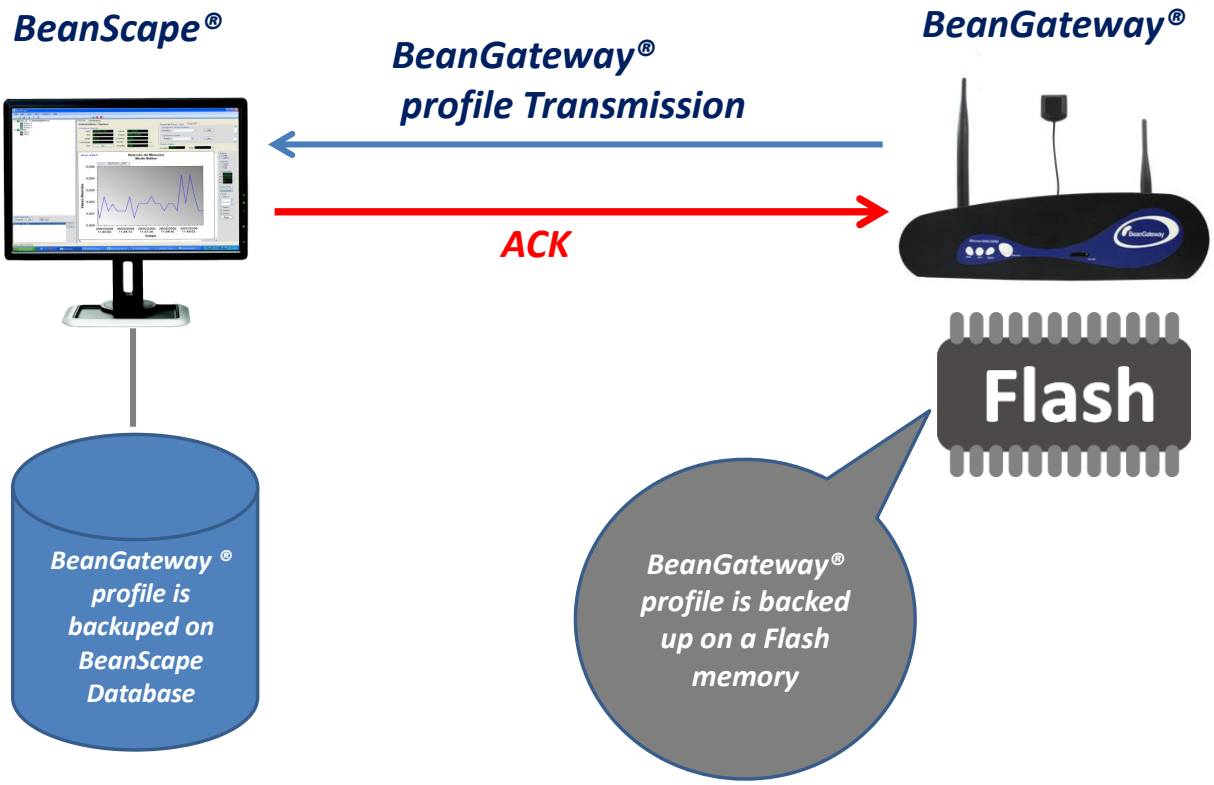
Step 1: Socket connection

- When the BeanScape® is launched , it starts listening for a TCP socket connection
- When you power up the BeanGateway®, a request for socket connection is established between the Beanscape® and the BeanGaterway®
- If this request is accepted by the BeanScape®, an confirmation (or ACK) is transmitted by the BeanGateway® to the BeanScape®



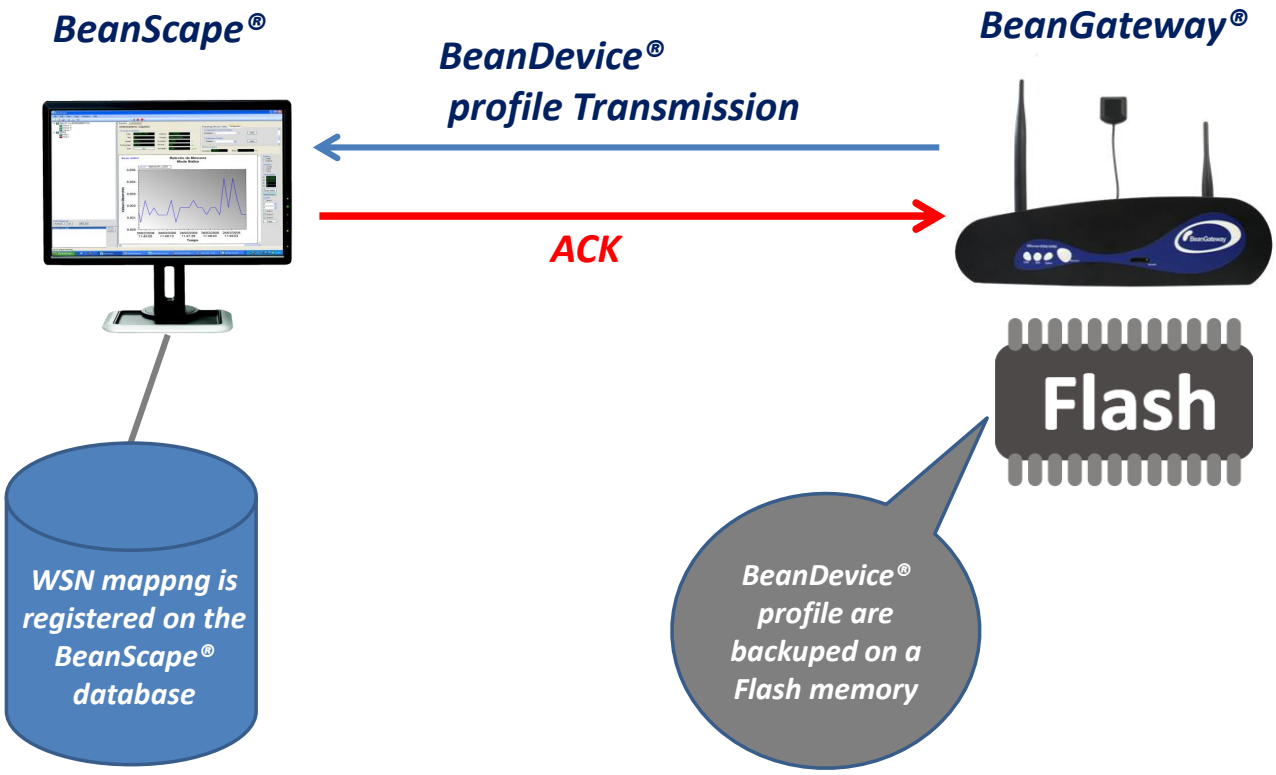
Step 2: BeanGateway® Profile Transmission

- The BeanGateway® profile is recorded on its flash memory. This profile contains informations regarding the BeanGateway® adress (NWK Add, PAN ID, MAC ID, IP...) , versions ID (Hardware, embedded software, stack...), Radio Management parameters (Radio channel, TX Power, ...);
- The BeanGateway® profile is transmitted to the BeanScape®



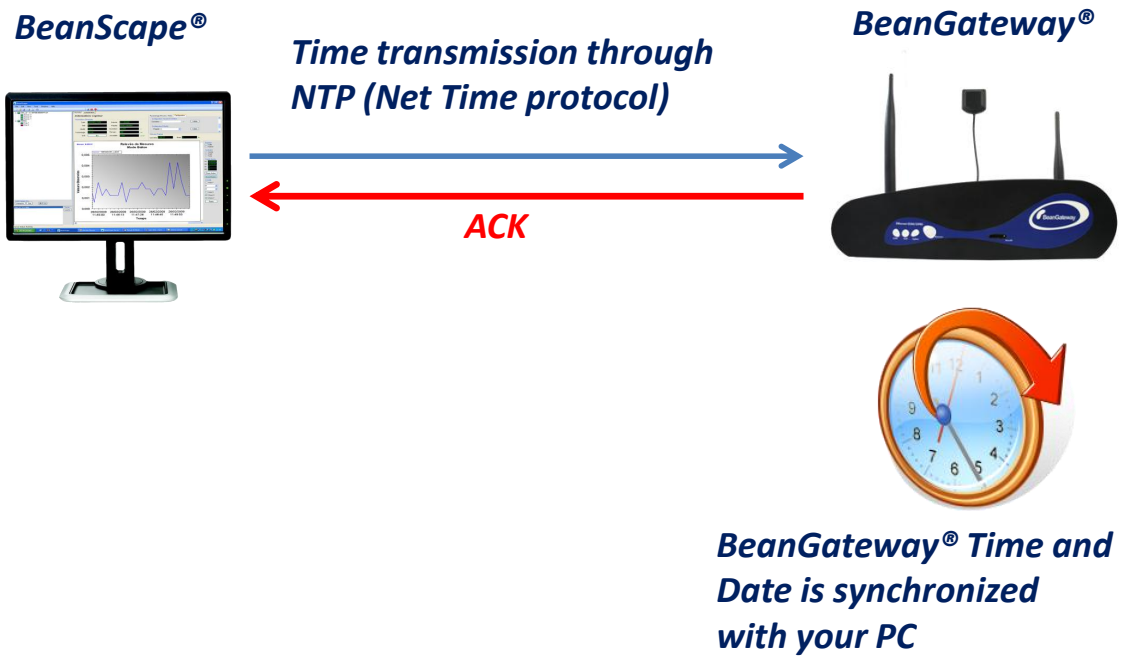
Step 3: WSN Mapping transmission

- The WSN mapping concerns all Beandevice® profiles. The WSN mapping is backed up on the BeanGateway® flash memory. When a new BeanDevice® joins a WSN, its profile is transmitted to the BeanGateway® and the BeanScape®.
- The BeanScape® displays the WSN Mapping within the BeanDevice® profile;
- WSN Mapping is also backed up on the BeanScape® Database.



Step 4: Time & Date update

- The Date is transmitted to the BeanGateway by NTP (Net-Time Protocole)
- Time & Date are updated on the BeanGateway instantly
- The BeanGateway integrates a Real-Time-Clock directly powered by th internal battery which allows to maintain the Date when the BeanGateway® is powered down
- The Date is updated instantly on the BeanGateway®

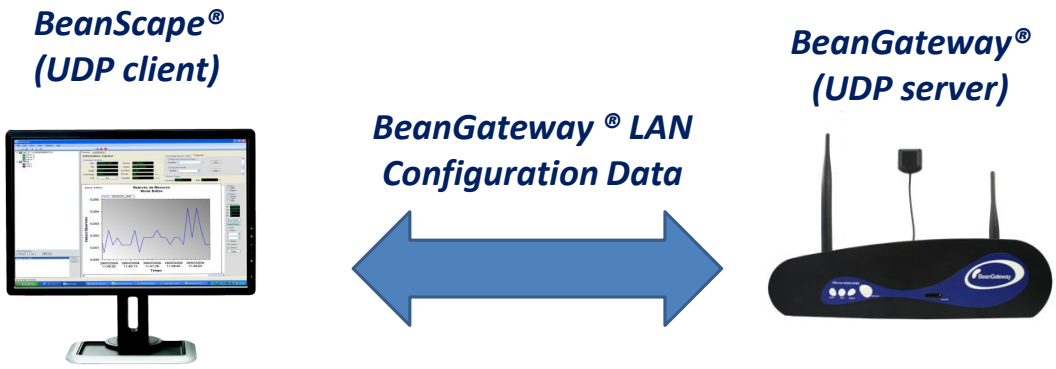


The WSN Time & Date is synchronized with your PC. The User must make sure that the Date on his computer is not wrong.

6.2 COMMUNICATION FOR BEANGATEWAY® LAN CONFIGURATION : UDP LINK

The BeanScape® provides a LAN configuration tool allowing the user to accelerate the integration of the BeanGateway® on a LAN infrastructure.

6.2.1 Overview

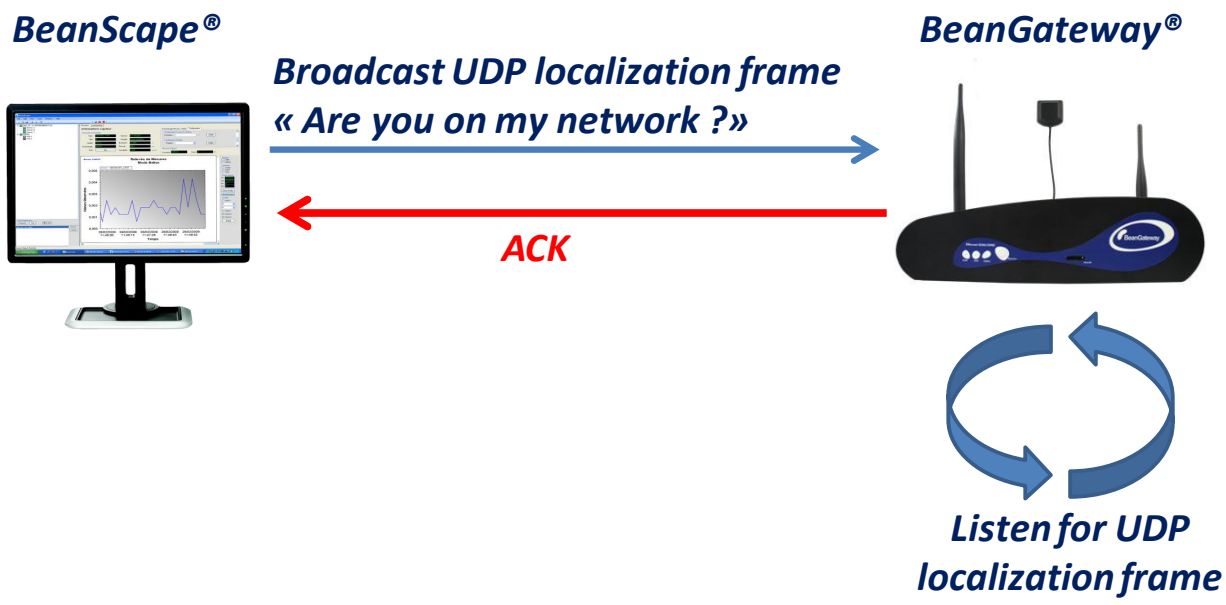


The BeanGateway® UDP Port must be known by the BeanScape®.

6.2.2 Communication steps

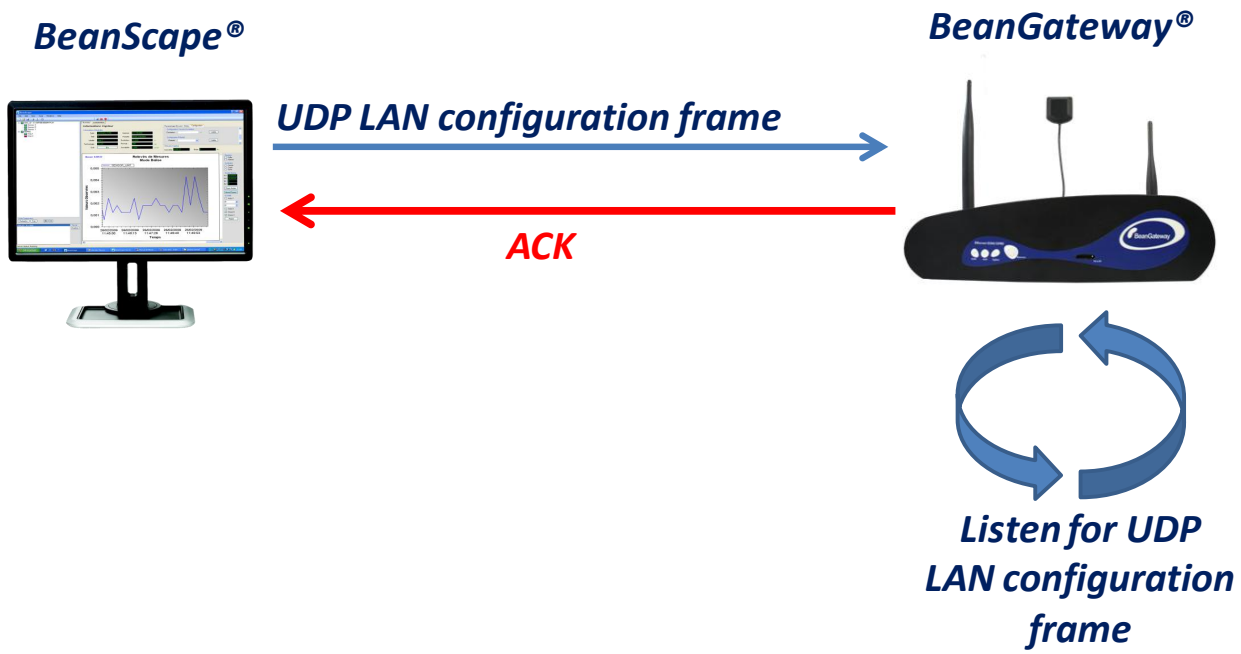
Step 1: Localization

- The BeanScape® broadcasts an UDP frame for locating the BeanGateway®.
- All the BeanGateways® present on the Ethernet network replies with an ACK.
- All the discovered BeanGateway® are listed by the "BeanGateway® LAN configuration Tool".



Step 2: Configuration

- The user validates a configuration for a BeanGateway®. This configuration will be sent by the BeanScape® to the targetted BeanGateway®
- Once the configuration is received and validated by the BeanGateway®, it will reply by an ACK to the BeanScape®.



6.3 KEEP ALIVE FEATURE

A "keepalive" signal is often sent at predefined intervals. If an emitted signal is left without any response signal then the link will be assumed as "Dead". A "keepalive" signal can also be used to indicate to the Network Infrastructure that the connection should be preserved. Without the "keepalive" signal intermediate routers can drop the connection after the timeout occurs.

Since the main purpose of the "keepalive" functionality is either to find links that do not work or to indicate links that should be preserved, "keepalive" messages tend to be short and not take much bandwidth. However, their precise format and usage terms depend on the communication protocol.

- The "keepalive" time is the duration between two "keepalive" transmissions in idle condition. TCP "keepalive" time period is required to be configurable and by default is set to no less than 2 hours.
- The "keepalive" interval is the time duration between two successive " keepalive" retransmissions, (In case if no response to the first "Keepalive" has been issued from the target).
- The "Keepalive retry" is the number of retransmissions to be carried out before declaring that remote end is either not reachable or out of service.

7. BEANSCAPE® AND BEANGATEWAY® NETWORKS RELATED FEATURES CONFIGURATION

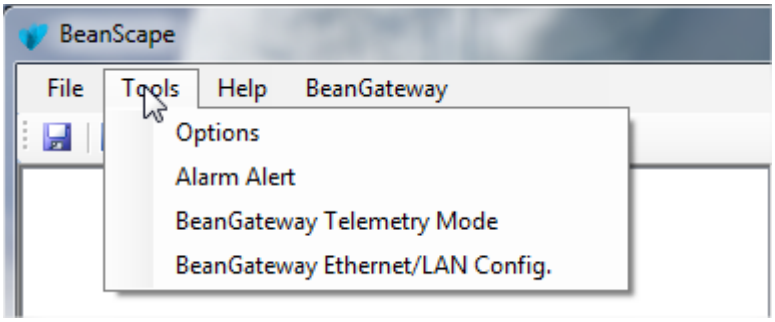
7.1 BEANGATEWAY® LAN CONFIGURATION (FOR ADVANCED USER ONLY)

Please check your Network settings before you make any changes.

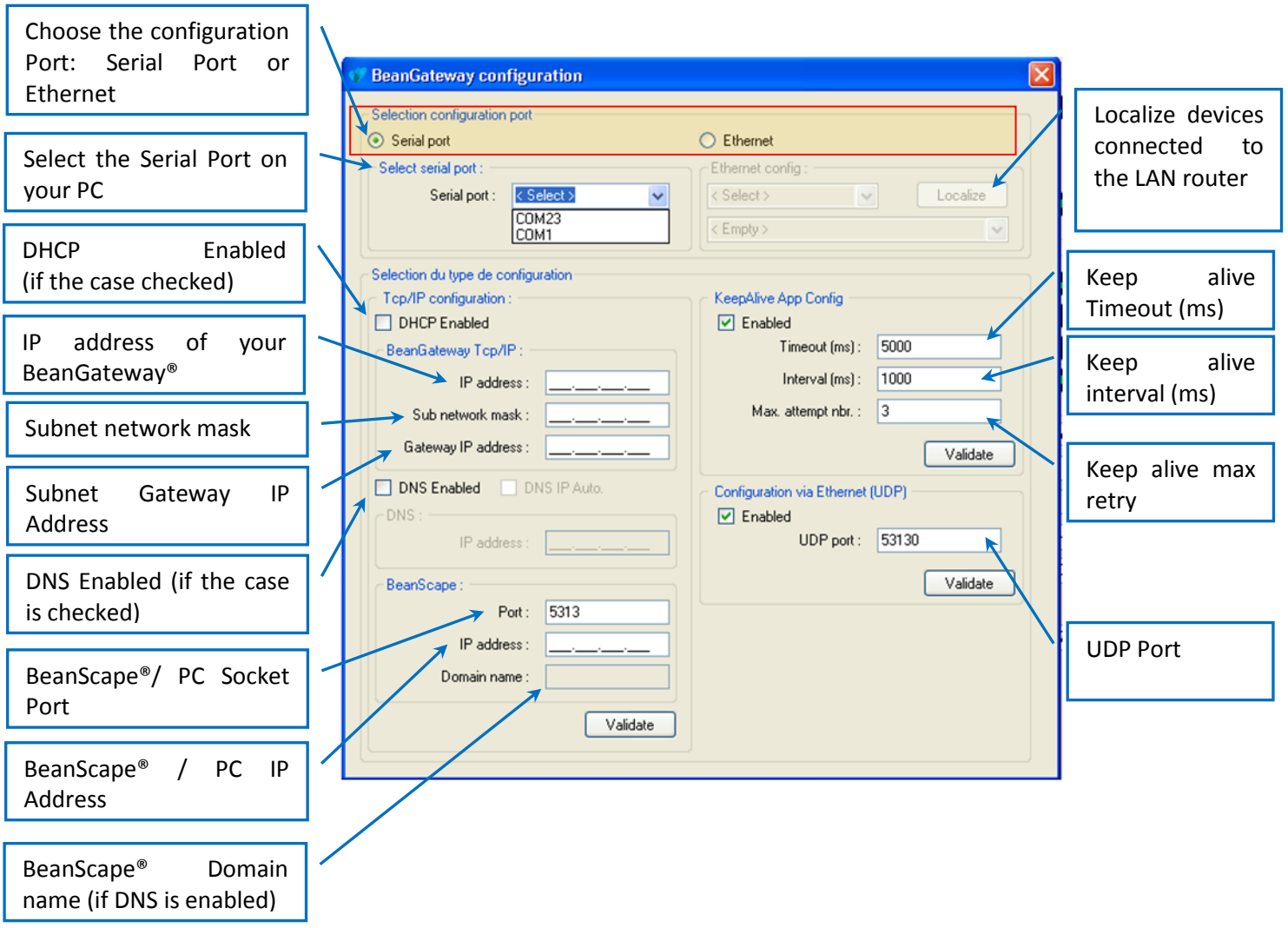
By default, the BeanGateway® is configured with a static IP address: **192.168.4.123**. This allows the user to quickly connect the Beangateway® to a PC.

If the user wants to set the BeanGateway® IP on the business network and get a dynamic IP address (via DHCP), you can configure the BeanGateway® from a serial port or from the Ethernet.

Go on your Beangateway® profile and click on Tools, then click on **Beangateway® Ethernet/LAN Config**.(BeanScape® version superior to 1.24.1296.8).



A new window will open called **Beangateway® configuration / Beangateway Ethernet/LAN Config** depending on the BeanScape version you use.



- ***DHCP Enabled***: Check this box if you want to enable the DHCP. For further information about DHCP read section: ***"What is DHCP?".***

- If DHCP is not enabled, the user must configure the Beangateway® IP parameters:

  - ✓ ***IP Address:*** BeanGateway® IP Address. The BeanGateway® IP address should have the following format: "X.Y.Z.B". With A, B, X, Y and Z numbers between 0 and 255

  - ✓ ***Subnet mask:*** mask of the network.

  - ✓ ***Gateway IP Address:*** The network router IP address. It should have the following format "X.Y.Z.1". If the BeanGateway® and the BeanScape® are on the same sub network, this value has no effect;

- ***DNS Enabled***: Check this box if you want to enable the DNS. For further information about DNS read the read section 2.1 of this document: ***"What is DNS ?".***

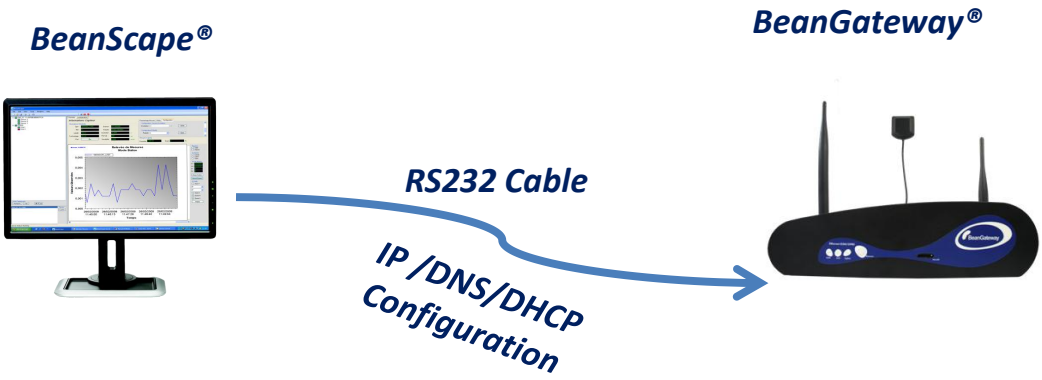
  - ✓ If DNS Server IP is given by the DHCP server, check DNS IP Auto, else DNS Sever IP must be fulfilled.

- BeanScape configuration :

  - ✓ ***Port***: By default the communication port used is «5313". This port is generally free, if not choose another Socket Port. The socket port must be the same for the BeanScape® and BeanGateway®. (sees Section TCP Port configuration (for experts user only)).

  - ✓ BeanScape® Domain Name must be fulfilled if DNS is enabled.

7.1.1 Configuration from serial Port



For this operation, a serial RS232 cable as well as a serial port is needed. A configuration from a serial port is more secured; you can "locally" configure your LAN parameters on your BeanGateway®.

If you don't have a RS232 port on your PC, use an USB/RS232 converter (provided as an option by Beanair):

Step 1
- Connect the serial cable to both your PC and your BeanGateway®
- Open the "Beangateway® configuration" window

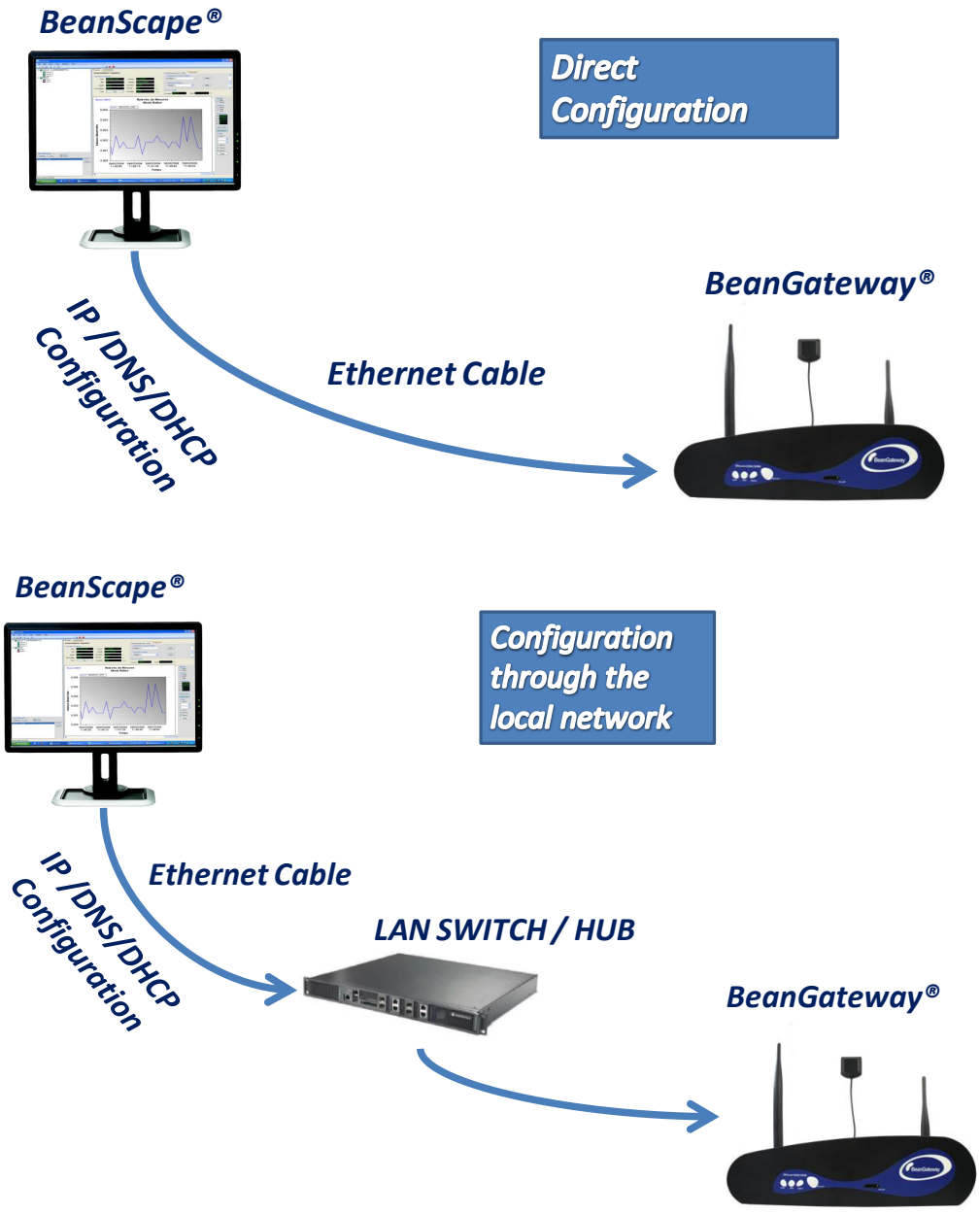
Step 2
- Choose Serial port for LAN Network configuration option
- Select the serial Port connected to the BeanGateway®

Step 3
- Start configuring LAN parameters your BeanGateway® (DNS, DHCP, IP ...)
- Click on validate in order to validate your configuration

Step 4
- Configuration will be acked if the operation is successful

7.1.2 Configuration from Ethernet

A configuration via the Ethernet link can be done. This operation offers more flexibility than a configuration via the RS232. The configuration can be done either directly or through the local network, as shown in the diagrams below.

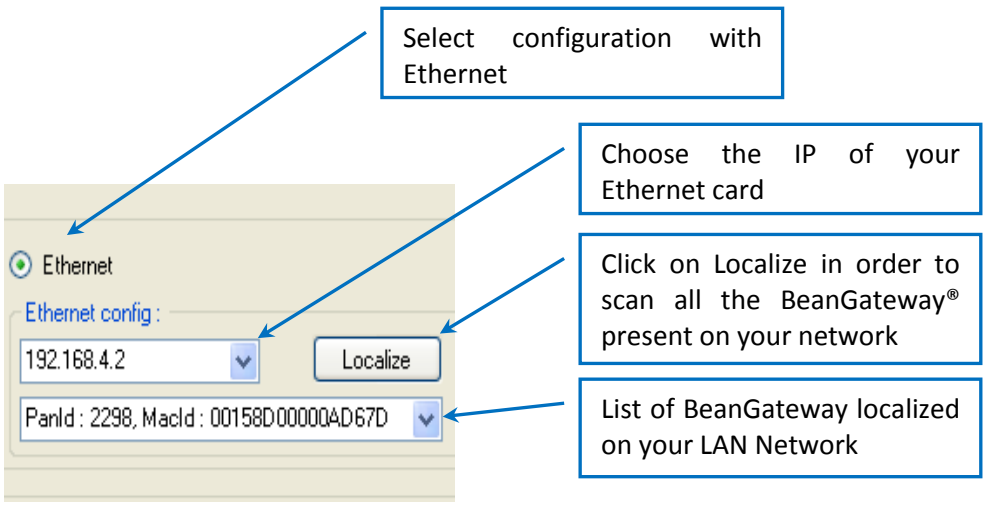


Step 1

- Connect the BeanGateway® to your PC or to a LAN Switch
- Open the "BeanGateway® configuration" window

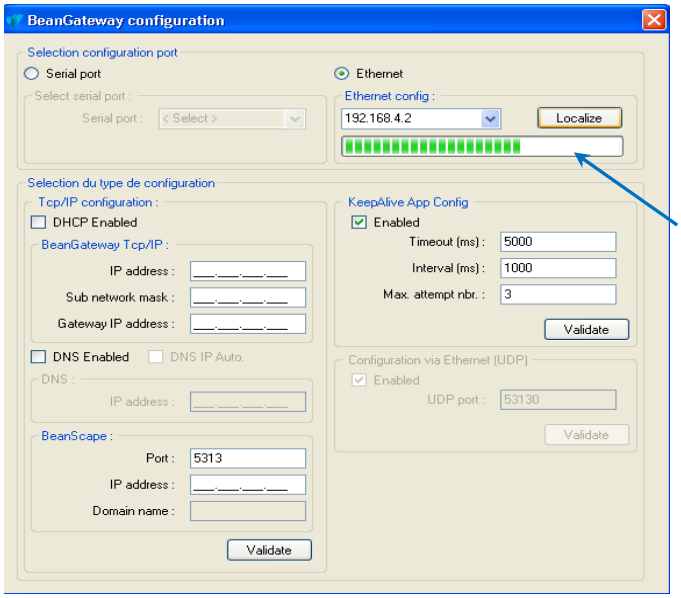
Step 2

- Choose "Ethernet" for LAN Network configuration option
- Select the IP Address of your Ethernet interface on your PC

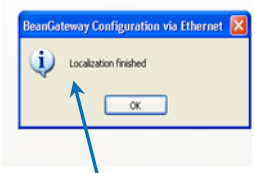


Step 3

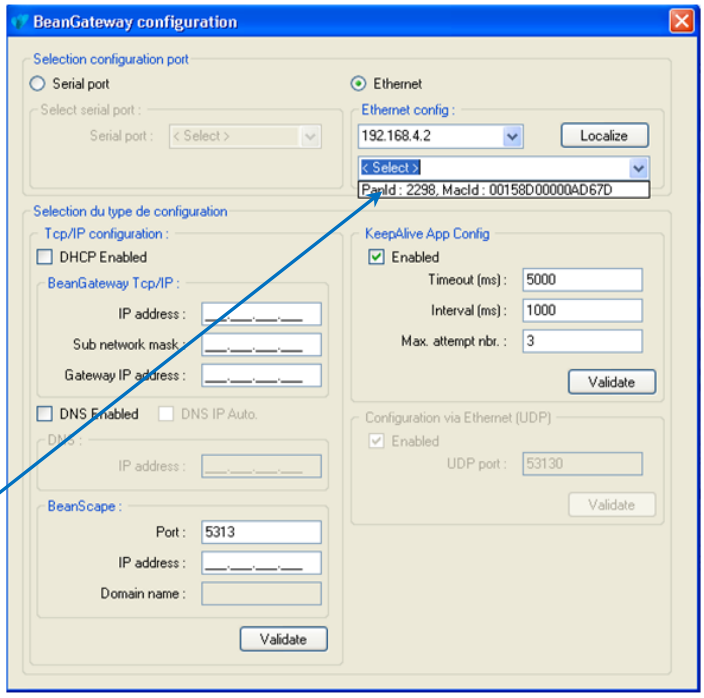
- Click on "localize" in order to scan all the BeanGateway® present on your network. BeanGateway® localization starts. When this process is done, a new window occurs"localization finished"
- A list of BeanGateway® present on the LAN Network is updated



BeanGateway® Location starts



A new window occurs, the scan is finished

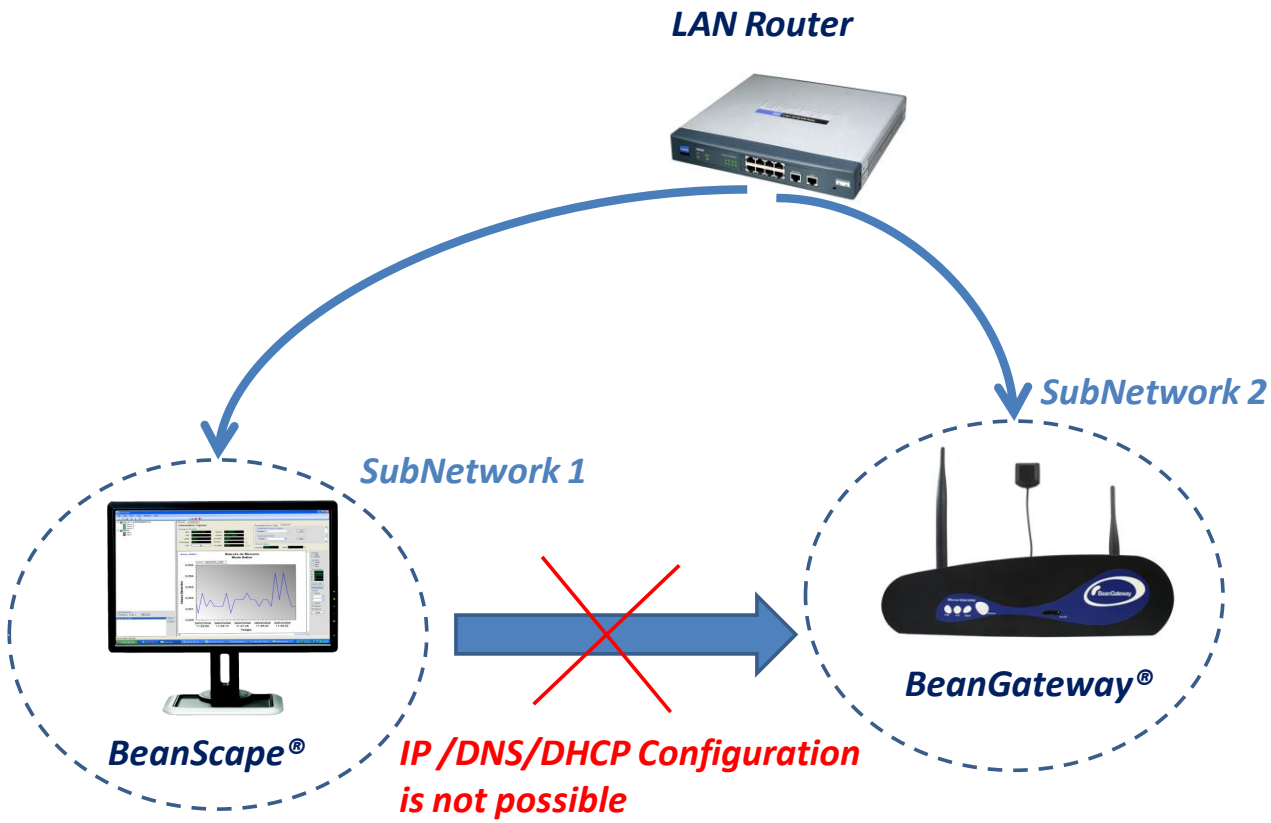


List of BeanGateway® present on the LAN Network

Step 4

- Select the BeanGateway® which must be configured
- Start configuring the BeanGateway® LAN features ("TCP/IP Configuration" frame)
- Click on "validate" button (TCP/IP Configuration frame) in order to validate your configuration

You will not succeed in localizing your BeanGateway® if it is on another subnetwork than your BeanScape®, i.e if there is a LAN Router between them.



7.2 BEANSCAPE CONFIGURATION

7.2.1 LAN configuration (for advanced users only)

The BeanScape LAN configuration is given by the PC LAN default configuration. To change the LAN configuration, you should change you LAN parameters on Windows.

To do this, please have a look in the troubleshooting section: Troubleshooting

If your computer has two or more networks interfaces, you can equally connect BeanGateway® to each interface, but you must ensure that BeanGateway® is well configured, i.e. that it is configured with the interface IP address that it is connected to (directly or indirectly).

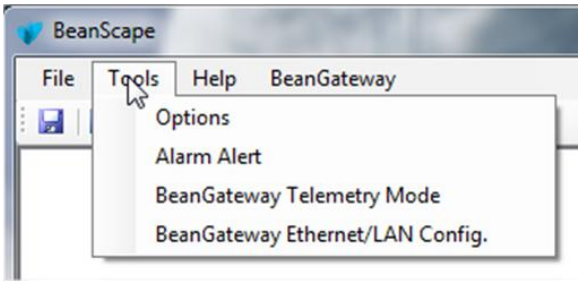
7.2.2 TCP Port configuration (for expert users only)

The default port used for communication between BeanScape and BeanGateway is the 5313 port. This port is generally free, but if not, you can choose another Port.

To change this configuration:

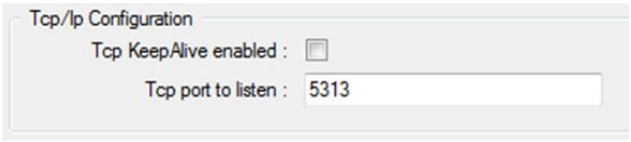
Step 1

- Go to your Beangateway® profile and click on Tools, then click on **Options**



Step 2

- In the TCP/IP section, you can change the "Tcp port to listen"
- Apply the changes and save



Step 3

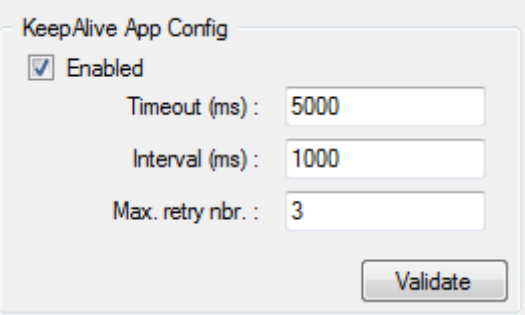
- If the server was previously started, stop it and start again, if else then just start the server.

Changing this parameter involves changing the BeanGateway configuration. Please refer to this section.

7.3 KEEP ALIVE CONFIGURATION

7.3.1 BeanGateway® side

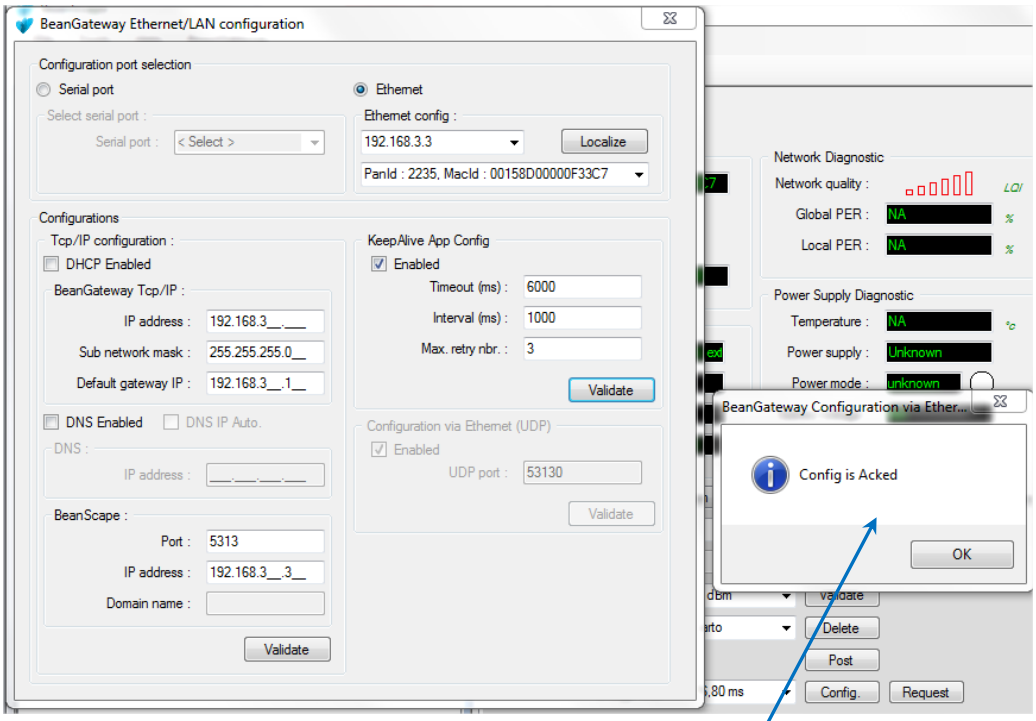
BeanGateway® Keep Alive configuration can be performed in the same window. You can enable or disable this feature by checking/unchecking the check box.



If the "KeepAlive" feature is enable, Keep Alive Timeout / Interval and retry number can be configured :

- **Timeout** is the time the Gateway may wait before it sends a KeepAlive frame.
- **Tnterval** is the time duration between two successive " keepalive" retransmissions, (In case if no response to the first "Keepalive" has been issued from the target).
- **Max retry nbr** is the number of KeepAlive frame transmissions retrieval to be carried out before closing the Ethernet socket (= the internet link is broken between the BeanGateway® and the BeanScape®).

Click on Validate in order to validate your configuration, a window will appear "Config is Acked"



A new window appears, your new configuration is ACKED

7.4 SECURITY OPTION: DEACTIVATE BEANGATEWAY® LAN CONFIGURATION VIA ETHERNET

By default, the BeanGateway® can be configured equally via Serial Port or Ethernet as shown in the section 4.1. For a better network security, the end user can disable the LAN configuration via Ethernet. Then, the only possible way to configure your BeanGateway® will be to use a Serial Port.

For this operation, a serial RS232 cable as well as a serial port is needed. A configuration via a serial port is more secured; the user can "locally" configure the LAN Network parameters on his BeanGateway®.

If you don't have a RS232 port on your PC, use a USB/RS232 converter (provided as an option by Beanair):

Step 1
- Connect your PC to your BeanGateway® through the serial cable
- Open the "Beangateway configuration" window

Step 2
- Choose Serial port for LAN Network configuration option
- Select the serial Port connected to the BeanGateway®

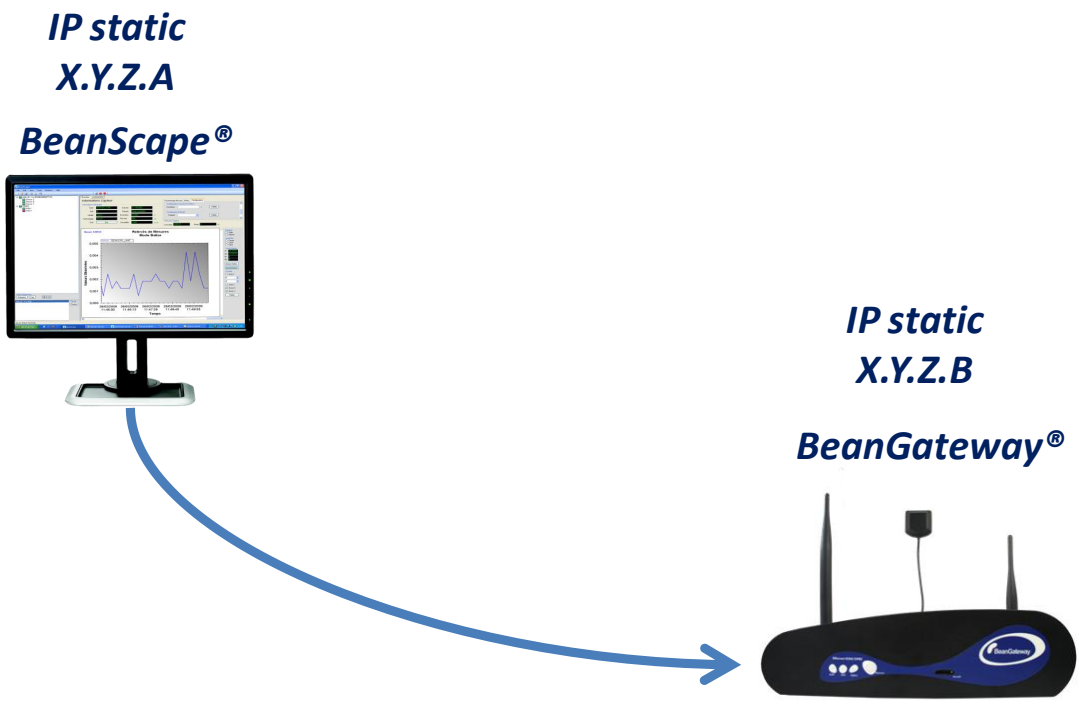
Step 3
- In the Configuration via Ethernet Box, uncheck "Enabled"
- Click on validate in order to validate your configuration

Step 4
- Configuration will be ACKED if the operation is successful

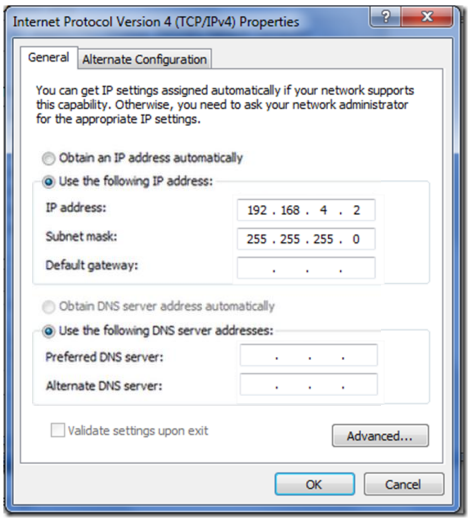
8. TYPICAL NETWORK CONFIGURATION EXAMPLES

In this section you can find some examples of network configurations that you can set up. The IP address and Subnet mask given in those examples can be changed to fit your own architecture. **If static IP configuration is used, be sure to set the right subnet mask regarding your network IP address system.**

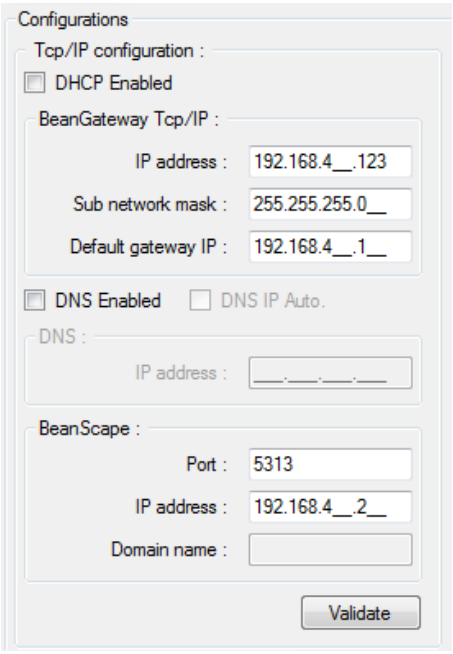
8.1 BEANSCAPE® AND BEANGATEWAY® CONNECTED THROUGH DIRECT ETHERNET LINK



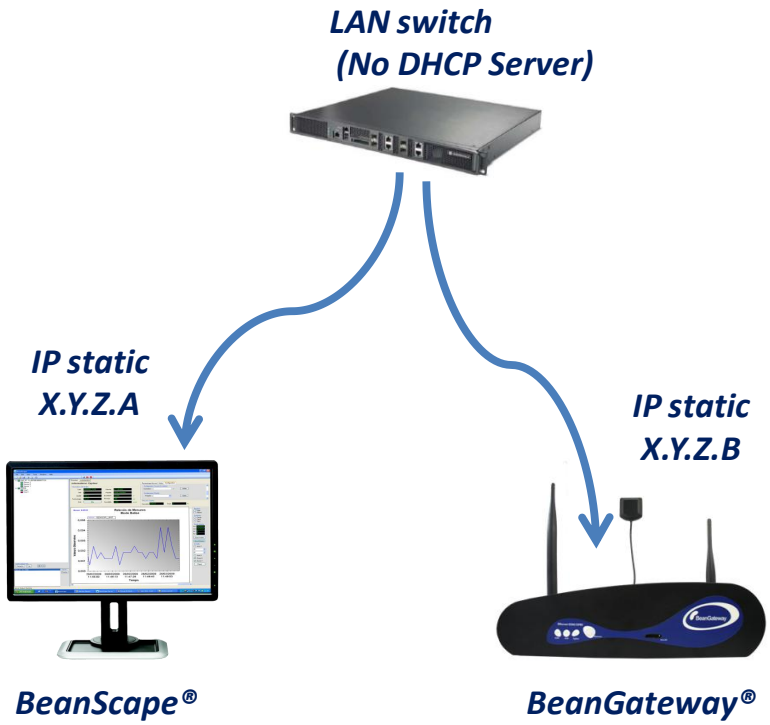
- The PC running the BeanScape must have a static IP configured on its Network interface. :
  - ✓ IP adress : 192.168.4.2
  - ✓ Subnet mask : 255.255.255.0
  - ✓ Default Gateway not necessary
  - ✓ DNS Server addresses not necessary



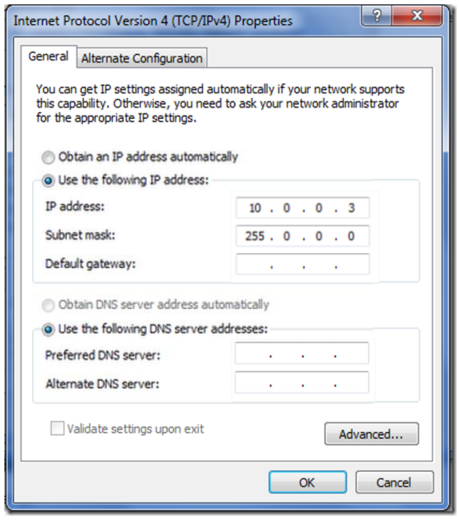
- The BeanGateway® will be configured with a static IP address
  - ✓ IP adress : 192.168.4.123
  - ✓ Subnet mask : 255.255.255.0
  - ✓ Default Gateway will not be used but can be filled
  - ✓ BeanScape IP address must be the same as the one defined above
  - ✓ BeanScape Port must be the same than the one defined in your BeanScape options



8.2 BEANSCAPE® AND BEANGATEWAY® CONNECTED TO A LAN NETWORK WITHOUT DHCP SERVER

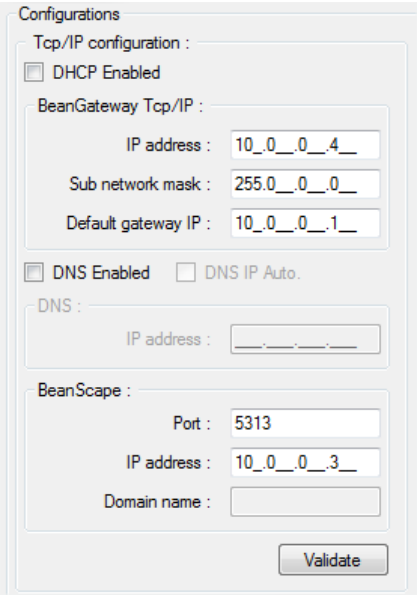


- ***Assign a static IP address on the PC running the BeanScape®*** :



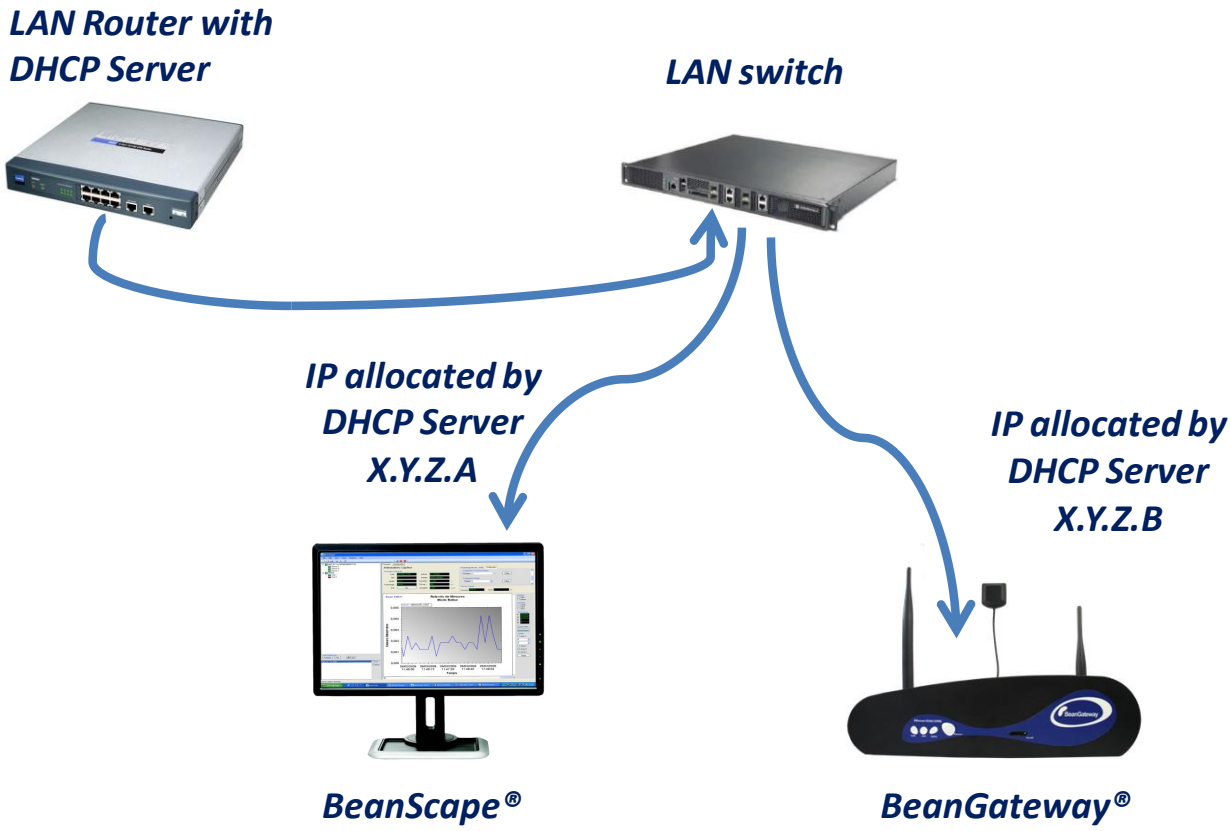
  - ✓ IP adress : 10.0.0.3
  - ✓ Subnet mask : 255.0.0.0
  - ✓ Default Gateway not necessary
  - ✓ DNS Server addresses not necessary

- ***Assign a static IP Address on your BeanGateway®***:

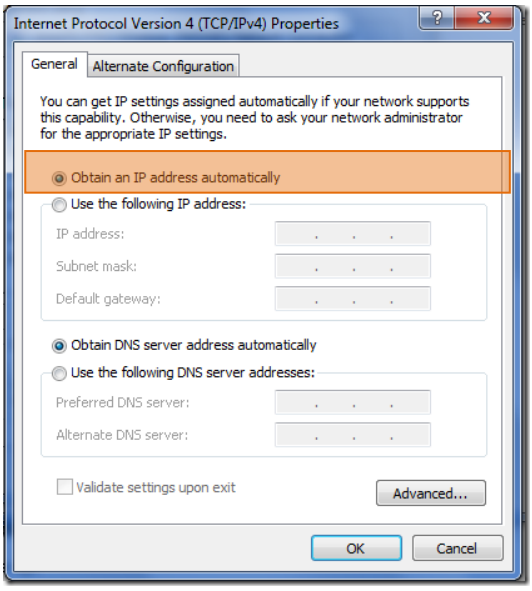


  - ✓ Enter your IP adress (example : 10.0.0.4)
  - ✓ Enter the subnet mask : 255.0.0.0
  - ✓ Default Gateway will not be used but can be filled
  - ✓ Your PC IP Running the BeanScape® must be the same than the one defined above
  - ✓ BeanScape® Port must be the same than the one defined in your BeanScape options

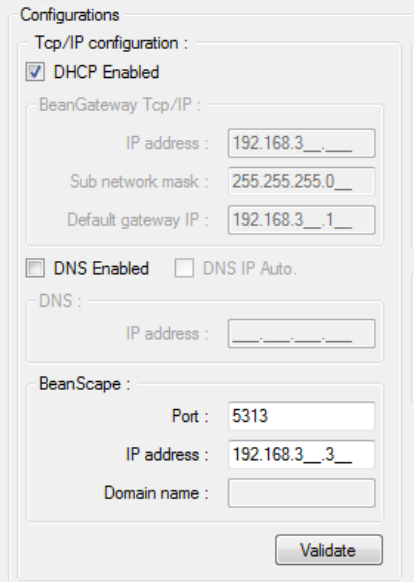
8.3 BEANSCAPE® AND BEANGATEWAY® CONNECTED ON A LAN NETWORK WITH DHCP SERVER



- Choose the "option obtain an IP address automatically" on your PC

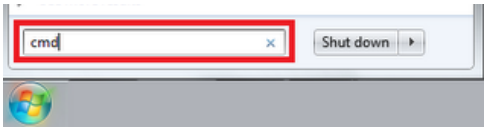


- Configure the BeanGateway® with a dynamic IP address
  - ✓ DHCP enabled
  - ✓ Enter the IP address of your PC running the BeanScape®



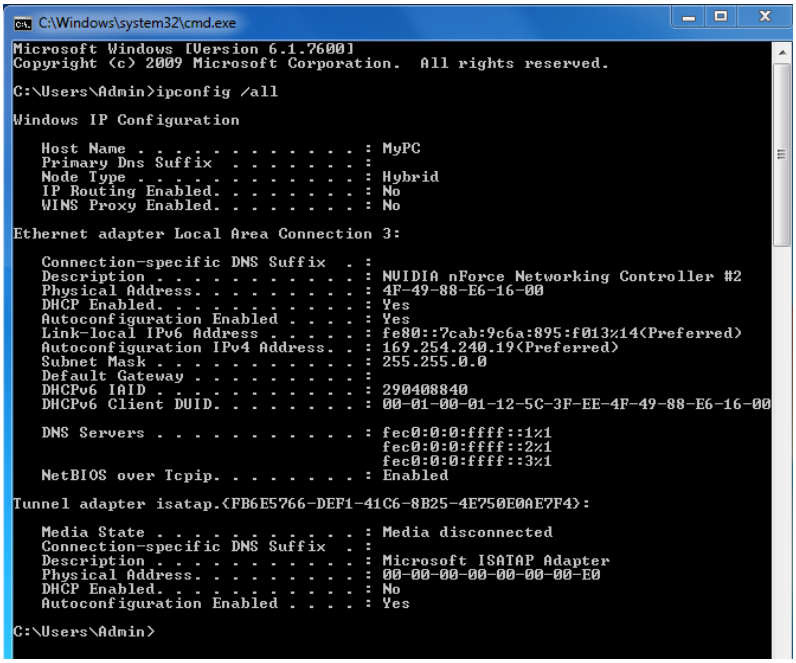
9. TROUBLESHOOTING

9.1 HOW CAN I GET THE IP CONFIGURATION ON MY PC ?



Open up your windows start menu and Type **cmd** in the "*Search programs and files* box" and press **Enter** on your keyboard. This will call the Windows command prompt window.

Type **ipconfig /all** in that window, and then press the **enter** key. This will display all the information regarding your IP configuration. If it scrolls off the top then you may need to enlarge the window.



9.2 HOW CAN I MODIFY MY PC NETWORK INTERFACE CONFIGURATION?

Please visit Microsoft support pages that will show how you can access and modify your PC interface configuration.

- For PC running Windows 7 or Vista :

http://windows.microsoft.com/en-US/windows7/Change-TCP-IP-settings

- For PC running Windows XP :

http://www.microsoft.com/resources/documentation/windows/xp/all/proddocs/en-us/howto_enable_dhcp.mspx?mfr=true