



Identification of People

Long Range RFID UHF Reader

GAT NANO



APPLICATION NOTE

Introduction

The purpose of this document is to describe the approach to use for a people identification project using UHF technology and GAT nano reader, to get optimal results according to the configuration and installation constraints.

General standards of UHF technology

Operating standard

GAT nano uses «passive» UHF (Ultra-High Frequency) technology: the chip does not require a battery to operate; its power is supplied by the reader.

The radiofrequencies used for this technology are in the band 860-960 MHz, depending on country regulations.

This passive UHF technology can therefore be used to read data from an electronic tag with no integrated power supply within a range of several meters.

Uses and limitations, environmental effects, useful information

Various laws of physics apply to this technology and can influence performances. The major factors to keep in mind are next:

- The materials on or behind the tag will influence global performance (range and speed). A tag should be matched to its environment to give the best results.
 - o The same tag will operate very differently on metal or behind glass (windscreen).
 - o **At this frequency there is a phenomenon of wave absorption in the presence of liquid conductive elements (ex: water).**
The human body will prevent the detection of a tag if the body is between the reader and the tag itself or if the tag is located too close to the body or if the tag is in the hand.
- The waves are partially reflected on surfaces: the waves emitted by the reader can bounce on obstacles and be deflected. The presence of obstacles in the RF field may influence the results.
- UHF technology can be directive: an antenna has its specific radiation pattern which can be more or less directive, like the area of a spot light. The location of antennas will therefore be planned on the basis of the targeted reading zone, depending on their characteristics.
- A UHF tag may have a specific orientation, related to the polarisation of its antenna. A “linear” tag will be orientation-sensitive and will not read as well horizontally as it does vertically or vice versa.

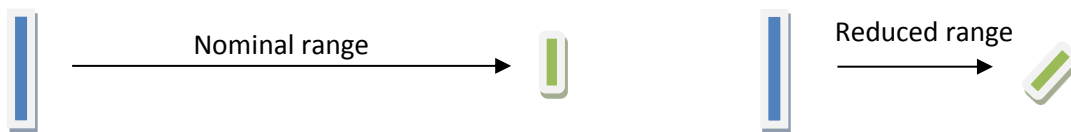
Optimum

Given the constraints described above, it is important to identify the conditions that will give the best possible system performance. This means ensuring the optimum antenna and tag positions.

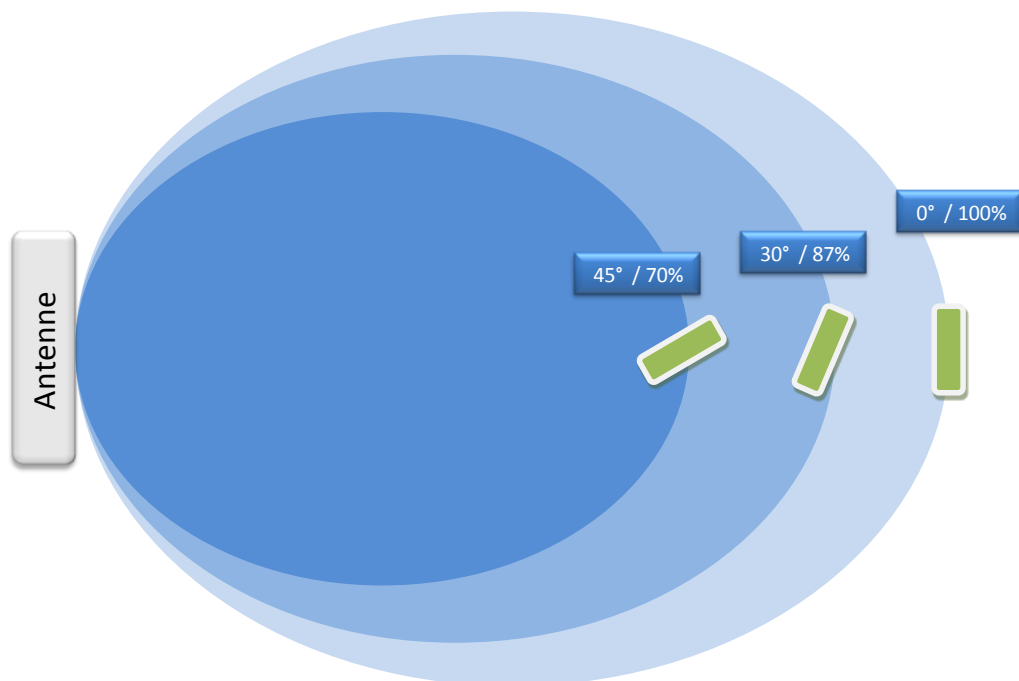
Performance will depend on the position of the tag relative to the antenna. Maximum range and optimized detection will be achieved if the tag is directly opposite the antenna, parallel to it, and with the correct polarization.

The range values given in technical specifications for the readers are measured in straight-on distances, with the tag parallel to the antenna.

When the tag is at an angle from the antenna, the effective range is reduced.



The angle in question may be a horizontal or vertical angle, depending on the comparative height of the antenna compared to the vehicle and the lateral offset of the antenna, compared to the lane of traffic.



New projects

When installing a site with GAT nano system, various steps need to be followed.

Site analysis

Gather the basic information required to define the configuration:

- Site map,
- Direction of traffic,
- Dimensionnements,
- Type of identification.

Project definition

Identification zones: define the areas in which people are to be identified

- Locations,
- Dimensions.

Testing

From the start, we recommend defining the tests required for validating the configuration with customer- if validation is required.

Important Notes

- In use, the GAT nano emit a front field but also some back field, when the GAT nano is installed against a wall identifiers located in the room behind the wall can be potentially detected. To solve this problem we recommend creating insulation of the wall (ex. metal paint on the wall).
- The person identification is a voluntary action.

The GAT nano is an identification people reader, in any case it is provided for the identification of the vehicle.

For a vehicle access, the driver must present the badge to the reader.

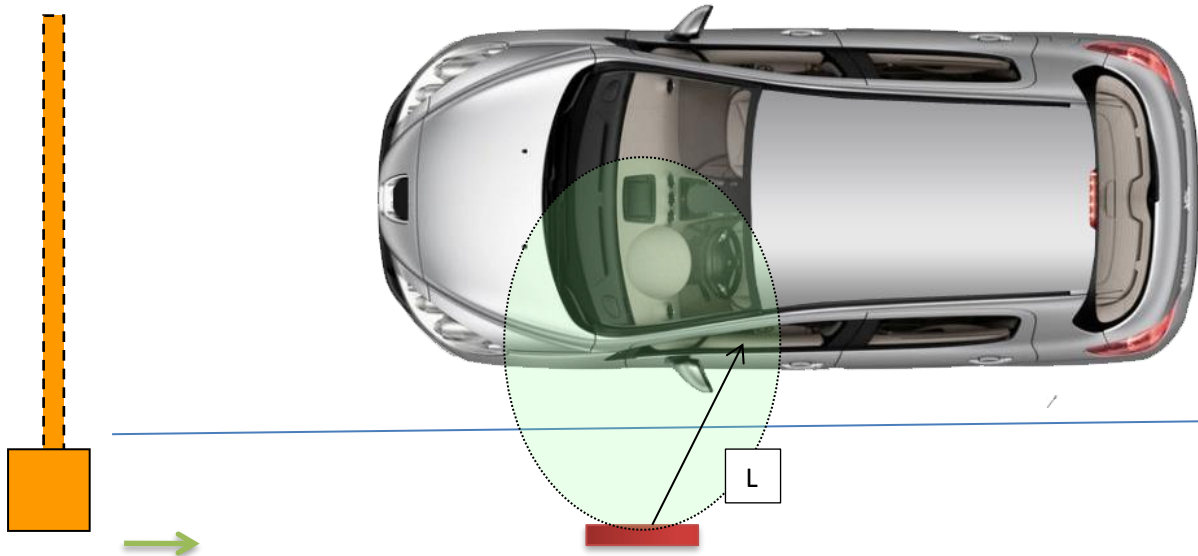
ACCESS WITH VEHICLE BARRIER

For a vehicle access gate, you are advised to place the antenna and set up the detection zone ahead of the barrier for more reliable detection and to allow the system time to activate the barrier opening system.

The detection is not impeded by the car window, it's not necessary to open the car windows for the badge is detected. Simply present the badge facing the reader.



With heat-reflective windscreens, the detection is only possible by opening the window.



The bottom of antenna must be positioned at a distance d , around 1m20 from the floor.

In this case, the distance of detection, L , when the badge is presented facing to the reader is, according to the identifiers used ⁽¹⁾:

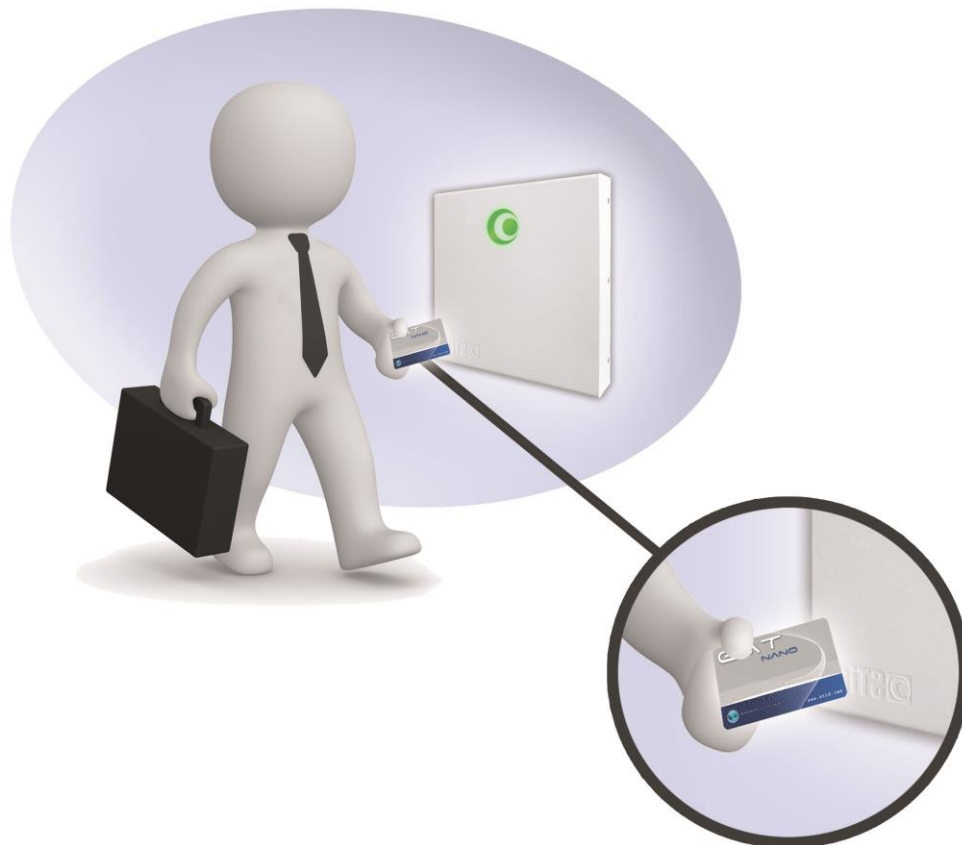
	L (cm)(Distance Reader // Badge)
ISO Hybrid Card UHF GEN2 + Mifare 1K Ref. STid CCTWR70	L = 240
ISO Card UHF GEN2 Ref. STid CCTW360	L = 290

(1): Detection distances depend on the installation environment of the reader. External perturbations can cause variations in reading distance.

ACCES WITH DOOR

The GAT nano is a long range reader that requires action to present the badge to the reader.

Note: The GAT nano is not a hand-free reader like the GAT, but its performance allow hand-free reading with qualified identifiers by STid.



CASE 1



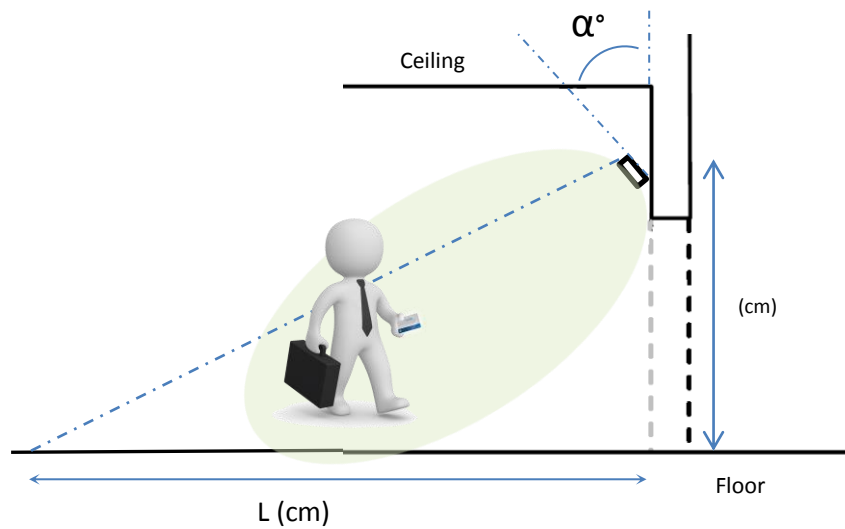
The bottom of antenna must be positioned at a distance d , around 1m20 from the floor.
 In this case, the distance of detection, L , when the badge is presented facing to the reader is, according to the identifiers used ⁽¹⁾:

L (cm)	ETSI		FCC	
	Power Max	Power Min	Power Max	Power Min
ISO Hybrid Card UHF GEN2 + Mifare 1K Ref. STid CCTWR70	330	130	195	145
ISO Card UHF GEN2 Ref. STid CCTW360	670	330	395	355
BAP	630+	340	570	330

If the card is not presented in front of the reader reading distances will be reduced.

(1): Detection distances depend on the installation environment of the reader. External perturbations can cause variations in reading distance.

CASE 2



In this configuration, the tests were made in “hand-free detection”, the ISO cards were placed on rigid badge holders.

The antenna should be mounted above the door.

In this case, the distance of detection, L, when the badge is presented facing to the reader is, according to the identifiers used ⁽¹⁾ and angle of reader:

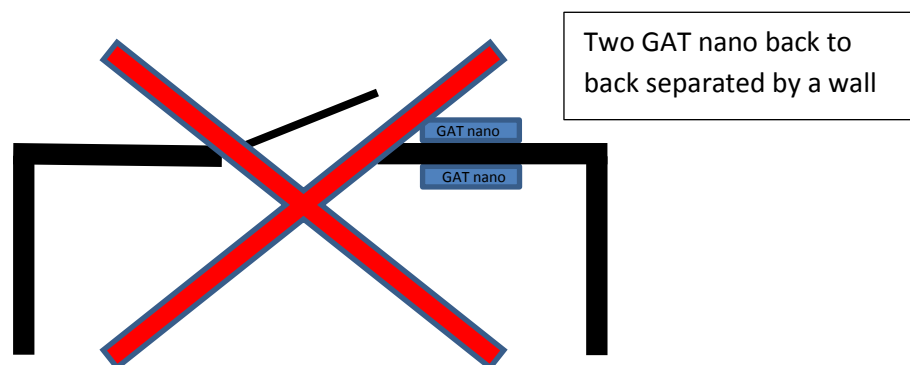
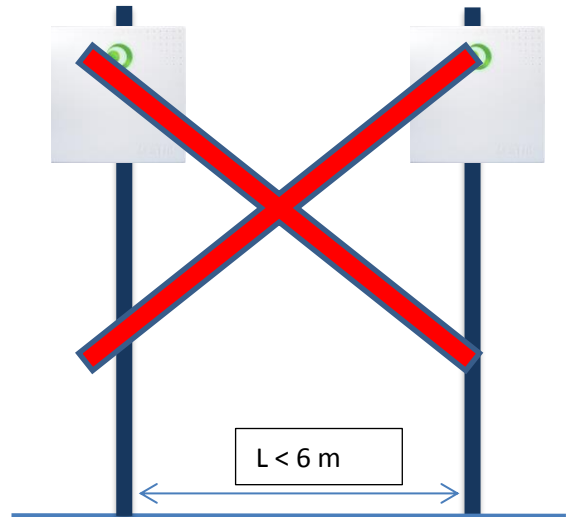
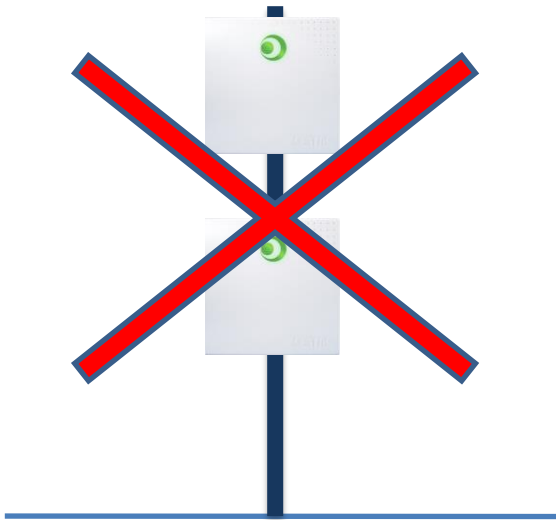
L (cm)	Nominal Power	
	$\alpha = 45^\circ$	$\alpha = 15^\circ$
ISO Hybrid Card UHF GEN2 + Mifare 1K Ref. STid CCTWR70	180	230
ISO Card UHF GEN2 Ref. STid CCTW360	240	370
Wristband Battery Assisted (BAP_WB2_AR)	200	270
Necklace Battery Assisted	370	480

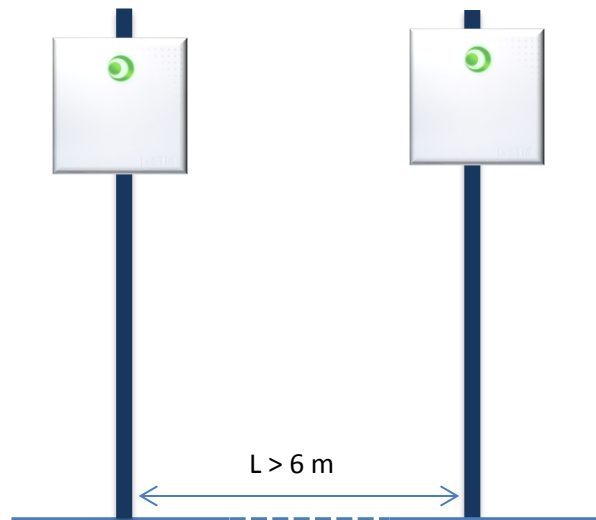
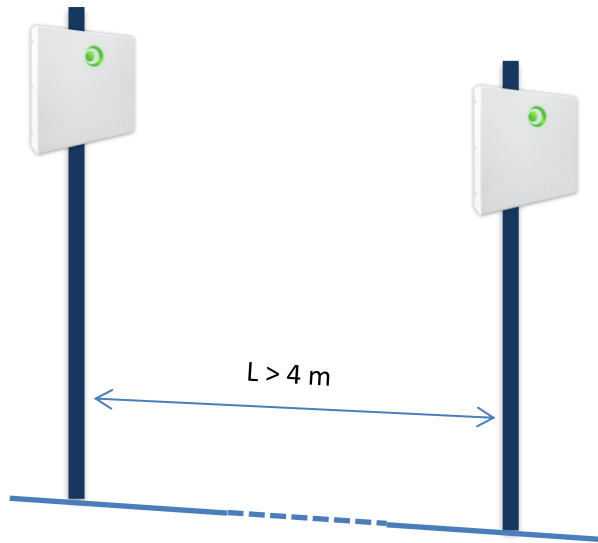
The angle of the GAN cannot exceed 15 ° with the supplied mounting kit (2). If for your application the reading distance is too large you can set up a reading detection with a cell.

(1) : Detection distances depend on the installation environment of the reader. External perturbations can cause variations in reading distance.

(2) : It's possible to have an angle more than 15° by adding a spacer between the wall and the player.

Installation of two GAT nano on the same plane or mast





Frequently Asked Questions

Issue	Probable cause	Recommendation
My reader frequently reboots.	Current too low	Check the cable types, power supply and distance between power supply and reader.
In RS485, bad communication (noisy signals, frame errors...).	The distance between the controller and the reader is close to or more than 100 meters.	Use end of line resistor (L).
My reader does not start.	Voltage too low Incorrect wiring	- Check the voltage at interface card terminals. - Use a regulated power supply. - Check the wiring.
When I present a tag, reader emits multiple BIP, the green LED blinks and the same code is retransmitted.	Filtering is not activated (the same TAG is read continuously)	Enable filtering, on interface board, by setting the switch (N) ON.
The data frame is not the one expected.	Incorrect configuration	Check reader configuration (specified in the order or made with Ultrys software).
	Incorrect communication protocol	Place the switch SW1 (M) on the good position (4 : OFF, 3 : RS485, 2 : RS232 et 1 : TTL).
<i>My reader detects the tag but I have no data in my system.</i>	No common reference potential to the reader and system	Connect the GND reader to the GND system.