

Syntaxes for GS1 2D barcodes

Fact Sheet

What is a Syntax?

Syntax is how things are arranged in a specific way to have meaning. GS1 standard defines how data is encoded into different types of data carriers, currently. We have 4 different syntaxes within the GS1 system.

Application Identifiers (AIs)

Just like a phone number's area code which is used to identify which state you are calling from: Application Identifiers are prefixes used in barcodes to define the meaning and format of the data that is following it. For example: AI (01) denotes Global Trade Item Number (GTIN) and has a fixed length of 14 numbers (data format n14). There are over 300+ Application Identifiers and the full list can be viewed [here](#).

Syntaxes for GS1 2D barcodes

When representing GTIN+ attribute information (batch/lot number, expiry date, production date, serial number) in the GS1 2D barcode, there are only 2 options:

1. GS1 Element string syntax
2. GS1 Digital Link URI syntax

Both the above syntaxes are expressed using the Application Identifiers. Therefore, in either syntax it is possible to extract data items based on the AIs. This document summarizes the common points and differences between these two types of syntaxes. Here is an example of expressing data such as GTIN, Best before date, batch/lot number and serial number in both the syntaxes:

GS1 Element String Syntax

FNC1010931234567890717251122 10abc12**FNC1**21916122

Indicates that is a barcode symbology according to GS1 Standards

FNC1 also acts as a separator character and indicates the end of variable length data. <GS> can also be used for this purpose. This depends on the type of barcode.

Note: No separator character is used at the end of the last AI in the element string

GS1 Digital Link URI Syntax

<https://id.yourbrandname.com/01/04512345678906/10/abc12/21/916122?17=251122>

Protocol and Domain name

Data Order and encoding rules for both syntaxes

The GS1 element string syntax has a **preferred** data order and the GS1 Digital Link URI syntax has a **mandatory** data order.

For showcasing the rules in these 2 syntaxes the following Applications Identifiers are used as examples – AI (01) GTIN, AI (10) Batch/Lot number, AI (21) Serial Number, AI (17) Expiry date and AI (11) Production date.

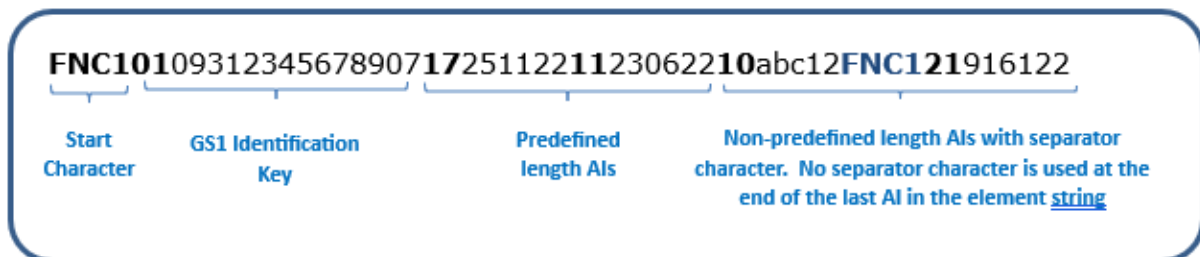
By definition in ISO/IEC GS1 DataMatrix uses a special start sequence to differentiate GS1 DataMatrix from other Data Matrix symbols. This is achieved by using Function 1 Symbol Character (FNC1) in the first position of the data encoded.

GS1 Element String Syntax

The Application Identifiers order in the GS1 Element string syntax is only a recommendation. This is purely to enable printing of smaller barcodes by reducing the separator characters required.

	Recommendation	AIs
1	The predefined length AIs are first placed ** Recommendation is to start with the GS1 Identification Key such as GTIN (which also comes under the predefined length AI) at the beginning. Rest of the predefined AIs can be placed in any order.	(01)09312345678907 (17)251122 and (11)230622
2	The non-predefined length AIs are placed after predefined length AIs ** (in any order). Note: No separator character is used at the end of the last AI in the element string.	(10)abc12 and (21)916122

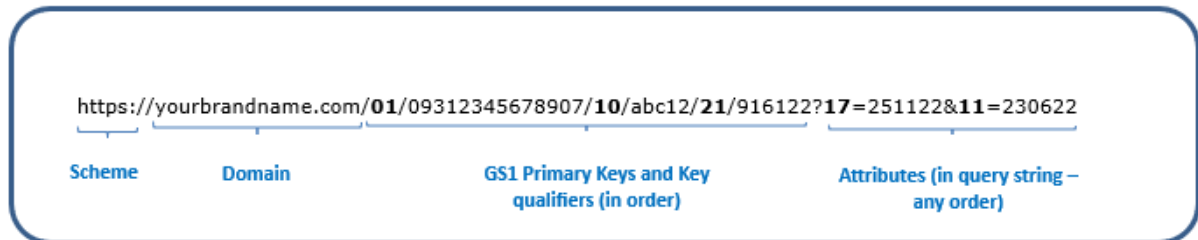
** Figure 7.8.5-2 in GS1 General Specifications show the list of predefined length AIs. All other AIs are non-predefined length AIs and require a separator character unless it is the last element string to be encoded.



GS1 Digital Link URI Syntax

The Application Identifiers order in the GS1 Digital Link URI syntax is a mandatory rule. It must be expressed in this order.

	Rule	AIs
1	Arrange Protocol and domain address as per W3C standards.	https://yourbrandname.com/
2	Place GS1 Identification Key such as GTIN comes first. They are called "Primary Keys" in the GS1 Digital Link URI syntax standard.	01 /09312345678907/
3	Then place the Key qualifiers which are attribute data designated for use as part of a compound key such as batch/lot, serial number etc. The specificity of the Identification Key increases from left to right. Separate AI and the data with a '/'. Separate AI and the data with a '/'.	10 /abc12/ 21 /916122
4	Place attribute data such as dates, weight, count etc. next. It is added as a query string and starts with a '?' at the beginning and AIs and the value is connected by '='. If there are multiple AIs use '&' to separate them. They can be in any order.	? 17 =251122& 11 =230620



Resources

- [GS1 General Specifications](#)
- [GS1 Digital Link URI Syntax](#)