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
0931234567890717251122 10abc121916122

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.

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>AIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>(01)09312345678907 (17)251122 and (11)230622</td>
</tr>
<tr>
<td>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.</td>
<td>(10)abc12 and (21)916122</td>
</tr>
</tbody>
</table>

** 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.

![FNC10109312345678907172511221123062210abc12FNC121916122](image)

FNC10109312345678907172511221123062210abc12FNC121916122

Start Character  GS1 Identification Key  Predefined length AIs  Non-predefined length AIs with separator character. No separator character is used at the end of the last AI in the element string.
The Application Identifiers order in the GS1 Digital Link URI syntax is a mandatory rule. It must be expressed in this order.

<table>
<thead>
<tr>
<th>Rule</th>
<th>AIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arrange Protocol and domain address as per W3C standards.</td>
</tr>
<tr>
<td>2</td>
<td>Place GS1 Identification Key such as GTIN comes first. They are called “Primary Keys” in the GS1 Digital Link URI syntax standard.</td>
</tr>
<tr>
<td>3</td>
<td>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 ‘/’.</td>
</tr>
<tr>
<td>4</td>
<td>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 ‘&amp;’ to separate them. They can be in any order.</td>
</tr>
</tbody>
</table>

https://yourbrandname.com/01/09312345678907/10/abc12/21/916122?17=251122&11=230622

Resources

- GS1 General Specifications
- GS1 Digital Link URI Syntax