



## Global 2D Programme - Foundational FAQs

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### Why should I switch from EAN/UPC (1D) barcodes to 2D barcodes?

Current 1D barcode solutions have data capacity limitations that will not allow them to unlock solutions to new business needs. There is a rise of one-off solutions that lack interoperability, and the use of multiple barcodes and symbols are cluttering up packaging. Additionally, human readable text is being used to communicate important product information that cannot today be automatically captured by systems for traceability needs.

### Is the EAN/UPC barcode going away?

No. 1D barcodes (EAN/UPC) will be around for at least as long as it takes for the installed base of 2D scanners to reach critical mass globally. Furthermore, if there is no need to add additional machine-readable data (such as batch/lot number or expiry date) to a product package, changing to a 2D barcode is not needed. But all manufacturers and brands need to include, at a minimum, the Global Trade Item Number (GTIN®) in every barcode on pack that is intended for scanning by consumers OR retail POS.

### What is the difference between the “Future of On Pack Coding” Programme and the “Global 2D Programme”?

The Future of On-Pack Coding was a programme initiated by GS1 in 2019 to study the issues related to more codes appearing on-pack. Through this program, a number of tools and collateral were developed, including a key learnings library of pilots and proofs of concept from around the world that utilise 2D barcodes for a variety of use cases. The Global 2D Programme is now the next phase of work that focuses more explicitly on driving education, technical guidance and adoption of 2D barcodes, especially in retail and at the point of sale.

### Do I have to keep 2 barcodes on my product for a transition period? If so, how long?

Optical scanners are becoming more common in retail, but a substantial percentage of linear scanners are still in use. POS systems will need to be updated to be able to scan new, more advanced data carriers and extract the GTIN from all barcodes scanned on a pack. Until these updates have been made across all retailers, a dual-marking period with 2D data carriers and the existing EAN/UPC barcode will be needed. This will ensure that advanced use cases can be implemented by retailers who have upgraded their hardware and software while the existing price lookup function will still work for retailers who have not. Industry has set the ambitious goal of Retail POS scanners globally capable of reading and processing 2D barcodes by the end of 2027.

### What does the 2D Ambition date of 2027 include?

Although it is expected that the regions of the world may move at different paces, the ambitions goal of transitioning from legacy linear barcodes to new, more capable 2D barcodes will have an initial goal of Retail POS scanners globally capable of reading and processing both legacy and 2D barcodes by the end of 2027.

### What is the difference between the 2D barcode options (Data Matrix, GS1 DataMatrix, QR Code)?

**QR Code** is often used for consumer engagement because they are recognized by all smartphone cameras natively. Many existing implementations of QR Codes on-pack are now enabling proprietary experiences. Once

they are repurposed to use GS1 Digital Link URI syntax, they will transform into multi-use barcodes that allow BOTH consumer engagement and price lookup, eliminating the need for multiple codes on pack. QR Codes cannot be used at retail POS at the time of publication, but unlocking the reading of QR Code at retail POS is a top priority for our work.

**Data Matrix** has a compact design and also benefits from various printing methods for placing the symbology onto various surfaces. The Data Matrix symbology can be used for applications encoding GS1 Digital Link URI only.

**GS1 DataMatrix** features all the benefits of the Data Matrix symbology but only encodes GS1 element string syntax. It is the carrier of choice for items that require permanent, non-ink barcodes such as certain medical devices and may also be used in applications that do not require direct consumer scanning/engagement.

## Which 2D Barcode should I use?

Organisations looking to implement 2D need to select a data carrier and syntax based on their business needs and stakeholder capabilities. GS1 recommends actively engaging with partners to ensure the path forward is collaborative and the solutions are capable and compliant.

Capable

- Is the data carrier capable of encoding a GS1 data syntax/format?
- Can the data carrier be created and/or applied at the speed and quality required for the use case?
- Are those intended to interact with the barcode able to process it?

Compliant

- Does the barcode meet regulatory requirements?
- Is the barcode approved for standardised use for your application?

Collaborative

- Have the data, data carrier, packaging, scanning hardware/software and receiving systems capability to store/use data all been considered?
- Have all internal and external stakeholders been brought together to agree on and enable the transition to the future solution? Stakeholders can include local GS1 Member Organisations, industry/trading partners, and solution providers (label designer, printing, scanning, data storage and processing).

## What is GS1 Digital Link?

The GS1 Digital Link standard extends the power and flexibility of GS1 identifiers by defining how to encode the GS1 system of standards into web addresses (URIs), thus making them natively connected to the web. That means that GS1 identifiers, such as the GTIN, are now a gateway to consumer information that strengthens brand loyalty, improved supply chain traceability information, business partner APIs, patient safety information and more. The opportunities are limitless!

Where a URL typically points to a single, specific website, the GS1 Digital Link syntax enables connections to all types of business-to-business and business-to-consumer information. If you're adding a QR code to a product, using the GS1 Digital Link standard to encode your barcodes means you're not only providing a URL for people to scan, you are also carrying GS1 identifiers – the same identifiers relied upon throughout industry – and following a non-proprietary, no vendor-lock system. More information is available at the [GS1 Digital Link Landing Page](#)

## What additional data will be available at Retail point-of-sale?

Following is a sample list of applications and the additional data that could commonly be used to support industry's retail POS use cases.

Retail POS Use Case	Supporting Data
Product traceability	Lot/Batch #
Product Freshness or Waste Prevention	Expiration Date, Best Before Date
Variable Measure	Count of Items, Net Weight, Price

## How will having multiple codes on the package and 2D codes with more data impact scanning at the checkout?

Early evidence from pilots and implementations of 2D barcodes at POS have shown that scanning of 2D barcodes is just as straightforward, efficient, and fast as scanning 1D legacy EAN/UPC barcodes. Through the Global 2D programme, more complete testing will be conducted to provide additional insight into technical/performance questions like this. These tests will answer many of the most common questions that our community has about scanning performance and expectations, such as:

- How quickly can different barcodes be scanned with accuracy?
- How does encoded data (amount, type) impact scan speed and accuracy?
- If there are multiple barcodes on a pack (such as an EAN/UPC and a QR Code), how well do scanning systems find the right information they need?
- How should barcodes be placed in relation to each other for optimised scan results?
- How does the number of barcode scanning configurations (decoders turned on in a scan engine) impact relative scanning performance?

## How much space will be required on the package for a 2D barcode?

Symbol specification tables give minimum (.0148”), target (.0246”), and maximum (.0390”) dimensions for each barcode. But the amount of space on-pack, scanning environment, the quality of printing, and the resolution of the printing process all factor into the optimal dimension for the symbols on a package. A symbol that is too small may not be easily read by scanners, or it may be difficult to print at a high quality and sufficient resolution. If the symbol is too large, it may be too difficult to scan up close or to print with high enough quality or resolution.

To ensure that barcodes meet quality needs, it is highly recommended to adopt a barcode verification program. Verification can help companies understand the quality of their barcodes, whether trading partners can scan them, and what needs to be done to improve them.

## What are current adoption levels for optical scanners?

As reported in report “The Global Market for Stationary POS Scanners” by VDC Research ([November 2019](#)), the installed base for 2D stationary POS scanners in the US is over 50% and by 2023 the installed base will be 70% as the marketplace purchases almost entirely 2D technology. The report also indicates that global retailers are allocating on average 14% of IT budgets on POS systems. VDC forecasts that by 2023, the majority of **worldwide** retailers will be able to consume 2D symbologies at the point of sale. But keep in mind, upgrading POS systems from laser-based to optical scanning also requires upgrading and integrating the backend systems and infrastructure components that drive POS.