

# CAMERA-PHONE BASED BARCODE SCANNING

CTIA CODE SCAN ACTION TEAM

WHITE PAPER

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## Table of Contents

Executive Summary.....	3
Definitions.....	5
Introduction .....	7
OBJECTIVES .....	7
SCOPE.....	7
TARGET AUDIENCE.....	8
METHODOLOGY .....	8
Use Case Example .....	9
Recommended Ecosystem & Architecture .....	10
FOUNDATION FOR GROWTH .....	10
CARRIER COORDINATION.....	11
CREATING AND MANAGING CAMPAIGNS .....	11
Code Publisher / Brand .....	12
Sales Agents .....	12
Reporting Functions Supported.....	13
Campaign Manager.....	13
TECHNICAL ASPECTS OF ECOSYSTEM .....	15
Technology Overview.....	15
Benefits of an Indirect Encoding Model .....	17
Code Reader Application .....	18
Central Clearing House .....	18
Central Registry.....	19
Campaign Manager.....	19
Carriers.....	20
CCSAT Group.....	20
CODE SYMBOLOGIES.....	21
Implementation Plan .....	22
DEVICE SUPPORT.....	22
Downloading the Reader .....	22
Timing of Ecosystem Availability And RFPs.....	23
CROSS CARRIER RFPs, GUIDELINES AND SERVICE MARK.....	23
Open Standard Campaign Manager RFP .....	23
Central Clearing House RFP .....	24
Central Registry RFP.....	24
Additional Symbolologies and New Technologies.....	24
Marketing Guidelines and Suggestions .....	24
Service Mark Development.....	25
Background Material and Reference .....	25
BENEFITS OF CROSS CARRIER SUPPORT .....	25
MARKET DRIVERS.....	25
STANDARDS ORGANIZATIONS .....	26

## EXECUTIVE SUMMARY

The intent of this White Paper is to help define, develop, and promote a multi-player, interoperable ecosystem for camera-phone based 2D barcode scanning in the US market. A CTIA Code Scan Action Team (CCSAT) was formed in October 2007 under the direction of CTIA - The Wireless Association® (CTIA) to identify the means to stimulate early adoption of this service with US consumers.

Although open standard definitions and underlying technology platforms for camera-phone code scanning are still evolving, the goal of the CCSAT group is to establish an early ecosystem that allows the market to grow as future code scanning symbologies, solutions and players emerge. Primary areas of focus for the team include symbology support, ecosystem definition, device application requirements, and market implementation plans.

The CCSAT group reached the following conclusions regarding the introduction of 2D barcodes in the US:

- Any client application used by CCSAT carriers at introduction will support both EZ Code and Data Matrix code symbologies with Indirect access.
- The ecosystem architecture is designed to stimulate a multi-vendor, interoperable, competitive marketplace. Building blocks include: Carriers, Carrier Subscribers, Central Registry, Central Clearing House, Campaign Managers, Sales Agents and Code Publishers. It is possible that a single entity might function in one or more roles in the ecosystem, according to their own business objectives.
- Subscriber functionality expected to be supported widely includes the launch of a web browser, a pre-populated SMS text message, or a phone call. In addition, some advanced handsets will support the launch of a MMS text message, an email, a calendar event and a contact memo (business card).
- The team envisions multiple code symbologies and multiple campaign managers per code symbology. As a starting point, the first proprietary code symbology supported by the Carriers is EZ Code and the first open code symbology is Data Matrix. The group has selected a Campaign Manager for EZ Code and will release a RFP for a Data Matrix Campaign Manager. The group will also have a RFP in the market for the Central Registry and a Central Clearing House. The process for adding new symbologies and Campaign Managers is defined in the White Paper.
- The CCSAT believes that consumer education and reach are critical to the success of this service. Therefore, the CCSAT will issue a RFP for the development of a Service Mark, which is designed to let carrier subscribers know that a code is 'Safe to Scan', supported by the Carrier issued coder reader, and will result in an expected outcome.
- 2D barcode technology holds promise for enhanced reporting of consumer data to Code Publishers and Sales Agents. To fulfill this potential, the Campaign Manager will collect the following voluntary consumer-provided information through handset clients: age, zip, gender,

and household income. Additional enhanced data may be collected at the discretion of the Campaign Manager.

This paper provides an outline for mobile barcode scanning deployment in the United States. However, this fast-moving environment will require regular communication. The CCSAT will share additional information over time through the CTIA website, at [[www.ctia.org/codescan](http://www.ctia.org/codescan)].



## DEFINITIONS

**Campaign** - the term used for a 2D barcode scanning program that is offered to the subscriber. The term may refer to any program, content, or data service application that any entity chooses to provide through the process of obtaining and publishing a mobile barcode.

**Campaign Content Server** – the server that hosts the target action of a 2D barcode scan. This server may be owned and operated by a Campaign Manager, Sales Agent, Code Publisher/ Brand, or some other entity.

**Campaign Manager** – designs and hosts 2D barcode campaigns on behalf of its clients. Other than the Code Publisher and/ or Sales Agent, the Campaign Manager is the only entity that knows the target action of the code scan and associated destination address of the intended content or service. Outside of this paper, Campaign Management solutions may also be called “Campaign Aggregators”, “Code distributors” or “Remote Code Mgmt Platforms”.

**Carrier/ Operator** – the owner of the cellular network that facilitates the movement of 2D barcodes.

**Carrier Subscribers** – mobile subscribers from each carrier network.

**Clearing House** – the entity that receives an Identifier from Handset Code Reader Software and sends it to the Campaign Manager assigned to manage that Identifier. The Clearing House can also send the header, demographic, and scan data to Campaign Managers and acts as a scan data auditing site for carriers. Outside of this paper, the Clearing House may also be called “Home Code Management Platform” or “Gateway Server”.

**Code Publisher/Brand** - any entity choosing to use 2D barcodes to provide more convenient access to mobile data services and content.

**Code Reader Application** – the application that scans the 2D barcode and decodes an Identifier (data string) from the symbology. Outside of this paper, this application may also be referred to as “handset application” or “handset client”.

**Direct Access Model** – describes the direct encoding of campaign content or service address (e.g. a URL) into a 2D barcode. In this model, the code reader application will decode and execute the service request without assistance from the network. It then initiates access to the content or service.

**Header** – Information sent from a code reader application or the Clearing House, which includes the subscriber’s handset model, user-provided (but anonymous) demographic information, and Carrier.

**Identifier** – an alphanumeric data string that is encoded into a 2D barcode. Each Identifier, which may include a symbology type indicator, is assigned by the Central Registry to the Campaign Manager, who uses it to uniquely link to a destination address of campaign content or service. Indexing of Identifiers with the specific Campaign Manager that registered them is kept in the Registry database and is shared with the Clearing House for routing of identifiers to the correct Campaign Manager.

**Indirect Access Model** – describes the encoding of an Identifier, rather than the campaign content or service address, into a 2D barcode. In contrast to the Direct Model, the handset application sends the Identifier to a Clearing House for authentication and routing to the appropriate Campaign Manager ('partial de-referencing'). Based on the Identifier, the Campaign Manager resolves the destination address of the intended content or service on behalf of its customers ('full de-referencing'), which is returned to the handset application for action.

**Central Registry** - the organization with authority to manage the creation and dissemination of Identifiers for use by Campaign Managers. Outside of this paper, the Central Registry may also be called "Code Registry Server" or "National/Regional Registry".

**Sales Agent** - sells 2D barcode campaigns to Code Publishers and works with Campaign Managers to enact the campaigns.



## INTRODUCTION

Mobile phones are always with us. Advertisers already use the mobile phone as a tool to interact with consumers. However, current options are either constrained or difficult to implement. In contrast, 2D barcodes allow owners of camera-enabled wireless phones to conveniently interact with print and electronic media. For example, consumers could use 2D barcodes to gain instant access to specific information, such as product and service prices, recipes, or bus arrival times. For Publishers, code scanning also provides rich targeted information and the ability to drive and collect responses, which will help them gain insight into scanning users. Overall, 2D barcodes will enable a higher level of mobile interaction and communication within the United States.

The CTIA Code Scanning Action Team (CCSAT) was formed in October 2007 under the direction of CTIA - The Wireless Association® (CTIA). The CCSAT group's goal was to identify the means to stimulate early adoption of 2D barcodes in the US. The group will accomplish this goal by supporting common code symbologies and an ecosystem architecture that enables both standardization and open competition.

### OBJECTIVES

This paper sets a foundation for camera-phone based barcode scanning in the United States. The CCSAT acknowledges that additional information will be required by market participants over time and the group will work closely with interested parties to build greater clarity.

The White Paper Objectives are as follows:

- Accelerate widespread publication and usage of camera-phone based barcode scanning in the United States.
- Define an early architecture with scale that attracts interested parties to begin participating in a coordinated manner.
- Set a foundation that encourages innovation and continual evolution of interoperable solutions through a wide range of participants.

### SCOPE

The scope of the camera barcode scanning White Paper includes:

- Defining an initial ecosystem for 2D barcodes in the US
- Classifying the roles and responsibilities for ecosystem entities
- Selecting initial code symbologies to support within the US ecosystem
- Identifying processes to add code symbologies and Campaign Managers to the ecosystem
- Defining the requirements for using the ecosystem Service Mark and the process for applying to use the Service Mark

The white paper does not discuss 1D barcodes or the technical aspects of 2D barcode symbologies. In addition, the paper does not address the presentation of barcodes on mobile phone screens for interpretation by an external reader. It does not address “client-less” solutions, where consumers use existing communication methodologies (such as Multimedia Messaging Services) to transmit an image to a server for interpretation. It also does not describe the process for procuring a code, the customer experience, or the way in which the codes are presented to customers in marketing or advertising collateral. Finally, this whitepaper does not define revenue models for code scanning, as the CCSAT believes these will develop through ecosystem participation over time.

## **TARGET AUDIENCE**

This whitepaper should be read by:

- Mobile Phone Manufacturers and Software Providers
- Campaign Management System Providers
- Code Scanning Technology Providers
- Mobile Carriers

This paper may also be of interest to Code Publishers including Brands, Marketers, and Advertising agencies involved in mobile marketing.

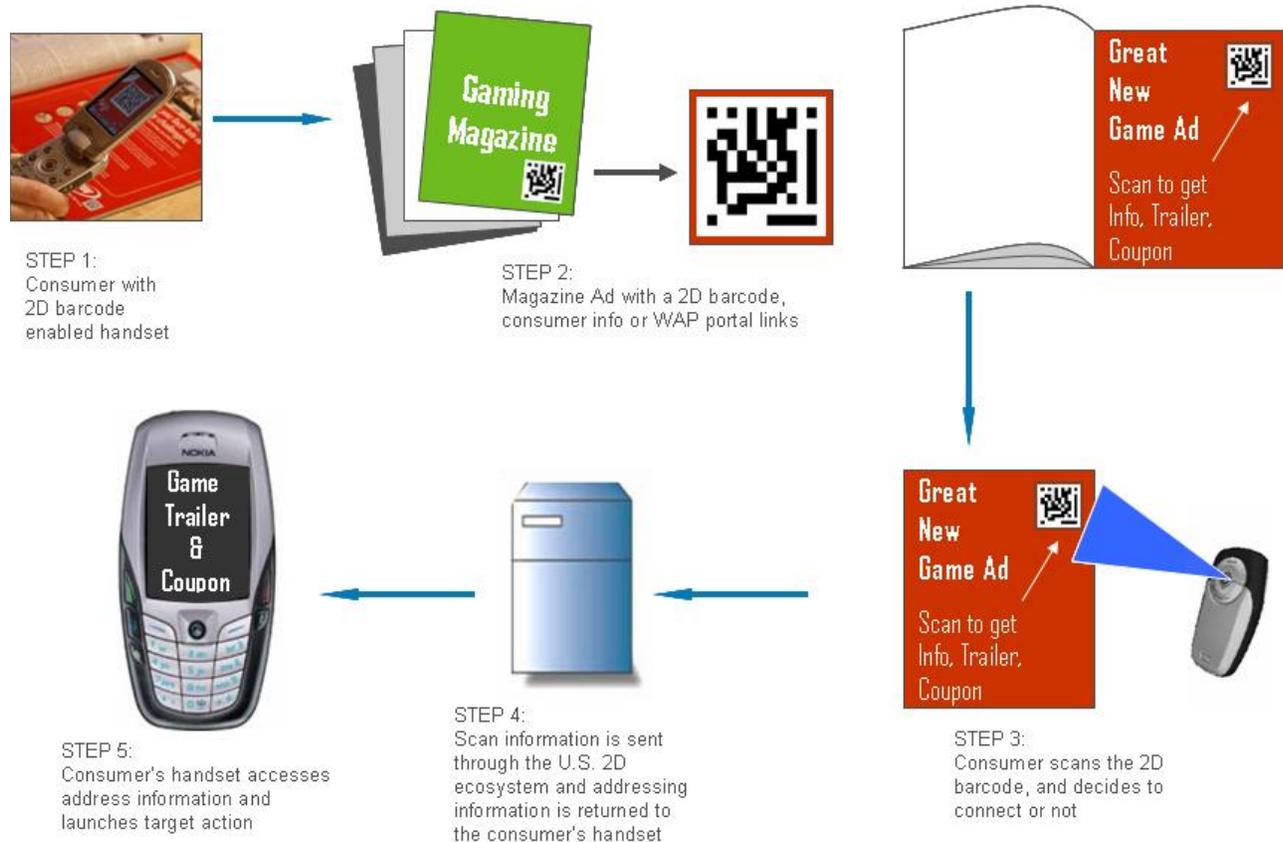
## **METHODOLOGY**

The CCSAT has engaged in a variety of educational experiences to guide the decision making process, including the following activities:

- Primary and secondary research into camera-phone based barcode scanning activity in countries around the world.
- “Request For Information” (RFI) distribution and evaluation of a wide range of code scanning industry participants, and collective evaluation of responses.
- Coordination with, and participation in, US and International standards bodies.
- Support for, and evaluation of, a wide range of trial activities.

## USE CASE EXAMPLE

To illustrate the power of 2D barcodes, the following is one example of a use case from the consumer perspective:



In this example, a consumer sees a 2D barcode in a gaming magazine advertisement. We will assume that the consumer has a handset capable of reading 2D codes and has downloaded the barcode reader application. The consumer is interested in learning more about the video game featured on the page, so she scans the 2D barcode with her handset. Within seconds, the consumer receives a preview of the video game with a coupon to purchase it at her local retailer.

While this is thought to be a typical use of 2D barcodes, there are many other envisioned use cases depending on a Code Publisher's needs. Other envisioned use cases could involve consumer packaging, newspaper articles, coupons, recipes, digital content purchases, mobile ticketing, and social networking.

Consumers receive the information they seek within seconds. It is during these few seconds that the processes enabling the information exchange take place. In the diagram above, Step 4 states, "Scan information is sent through the U.S. 2D ecosystem and addressing information is returned to the consumer's handset." The CCSAT group designed the ecosystem architecture to help enable Step 4, as defined in the following pages.

## RECOMMENDED ECOSYSTEM & ARCHITECTURE

### FOUNDATION FOR GROWTH

The technical building blocks described below are intended to kick-start the market. In the near term, offering 2D barcode service requires coordination among the following entities:

#### Code Publishers/ Sales Agents:

- Provide compelling campaigns

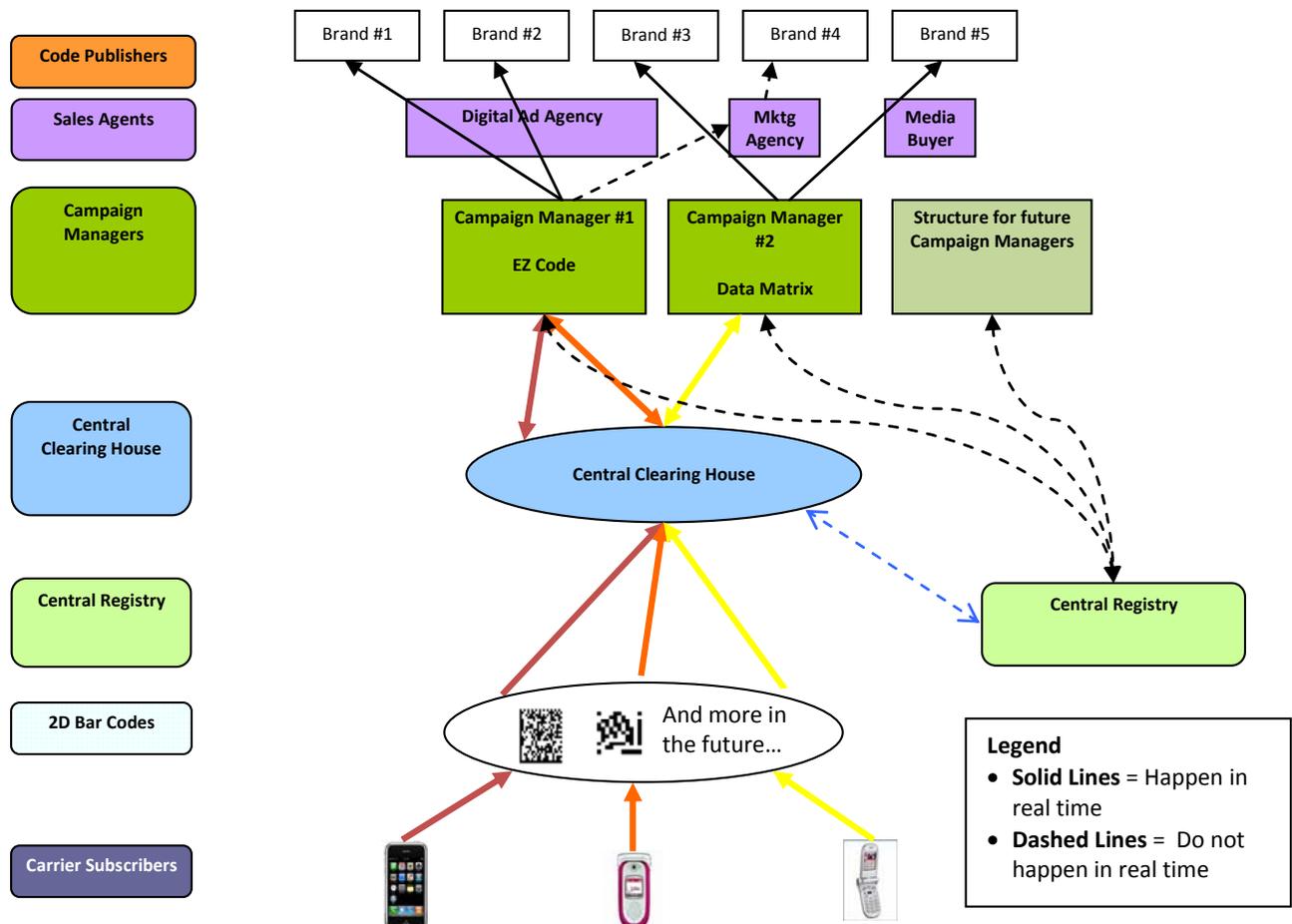
#### Technology Service Providers (Campaign Manager, Registry, Clearing House)

- Support the Code Publishers and Sales Agents through infrastructure

#### Carriers:

- Provide network support and ensure handset and application availability

With this coordination in mind, the following is a graphic depiction of the 2D barcode architecture:



This model is designed to be open to multiple vendors, allowing each vendor to participate in one or multiple interoperable roles. The model will allow for creative use of codes, the creation of services and market prices, and open competition across various functional levels in the ecosystem. Each entity is described in this paper.

### CARRIER COORDINATION

The CCSAT group has agreed to help provide standardized and reliable 2D barcode services in the United States. The group has therefore agreed to coordinate the creation of a Central Registry and Clearing House, the adoption of initial code symbologies, and rules governing the use of a Service Mark.

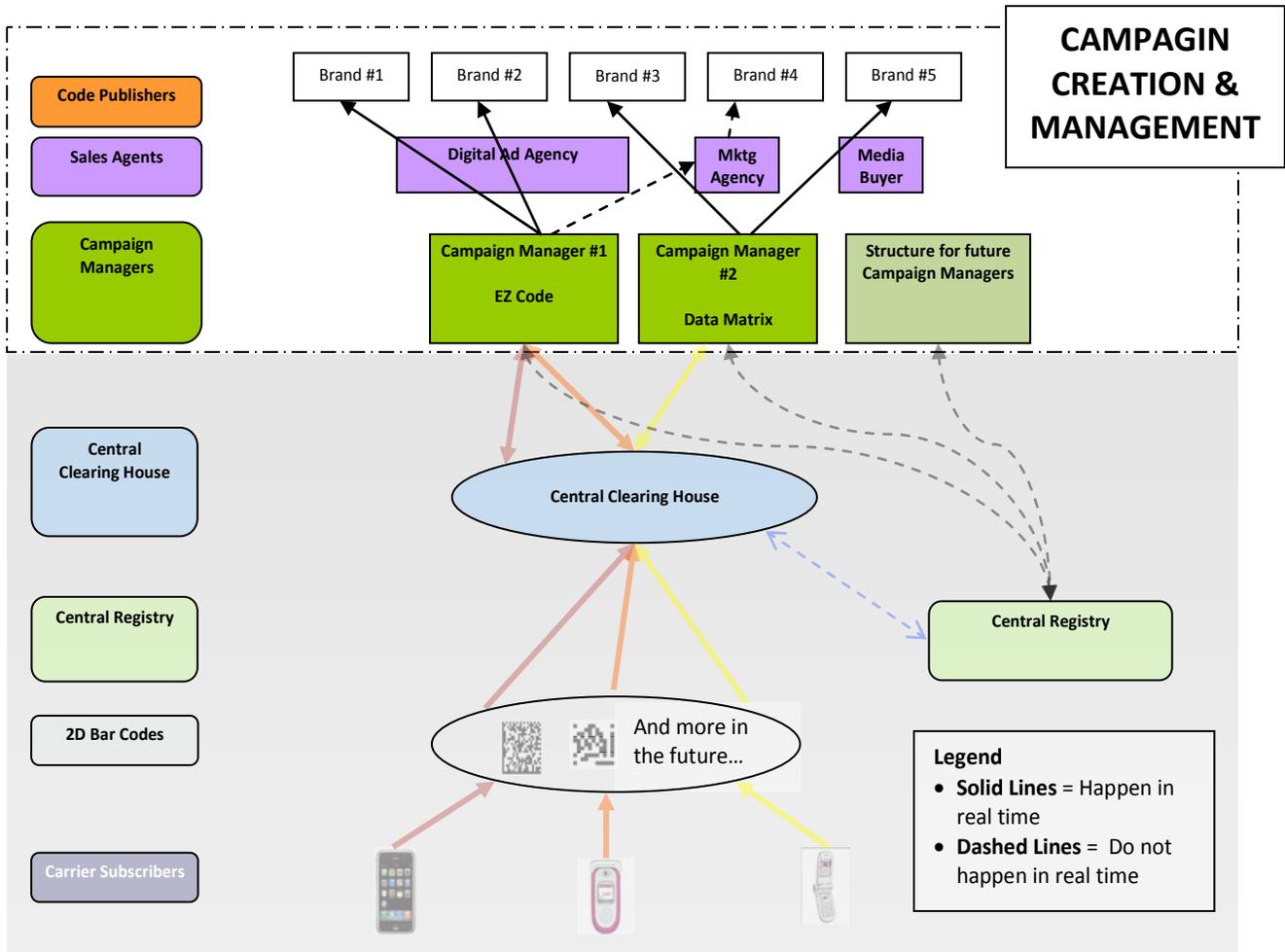
#### CTIA CCSAT Decision:

All member carriers will coordinate the creation of:

- Central Registry
- Central Clearing House
- Initial Symbologies
- Service Mark application

### CREATING AND MANAGING CAMPAIGNS

The functions supporting the creation and management of a campaign reside in the top three levels of the architecture, which include Code Publishers, Sales Agents and Campaign Managers, as shown below:



It is envisioned that Code Publishers and Sales Agents will utilize 2D barcodes to enable interactive campaigns. By doing so, these entities will reap the benefits of wider reach and enhanced targeting. A Code Publisher or Sales Agent will initiate a 2D campaign by contacting a Campaign Manager. The following is a description of these three entities and their roles in creating and managing a campaign:

### Code Publisher / Brand

Code Publishers include any entity choosing to use 2D barcodes to engage with their customers through more convenient access to mobile data services and content. A common example is a Brand. Brands may purchase advertising services that include 2D barcodes from Sales Agents or directly from Campaign Managers.

Code Publishers can select from several actions resulting from a scan. As an example, the target action of the 2D barcode may be to send the customer to the Brand's WAP site for information on a specific product. The CCSAT group has agreed to support specific actions that will result from a scan in order to provide standard choices to Code Publishers. The result of the group decision is as follows:

**CTIA CCSAT Decision:**  
All member carriers will exercise best efforts to support the following actions on all capable phones:

- Launch a WAP browser
- Pre-populate a phone call
- Pre-populate a SMS text message

In addition, though the population of capable handsets is smaller, members will attempt to support the following actions on capable enabled phones:

- Send a MMS message
- Save the Date to a Calendar
- Add a Contact to the Address book
- Pre-populate an Email

Code Publisher Responsibilities:

- Enlist a Sales Agent (Agency) or a Campaign Manager to manage the placement of 2D barcodes in a marketing campaign
- Select the target action of the 2D scan
- Provide the final destination address of the 2D scan (i.e. intended content or service)

### Sales Agents

Sales Agents sell 2D barcode campaigns to Code Publishers and work with Campaign Managers to enact the campaigns. Sales Agents may be advertising agencies, Carriers, Campaign Managers or any entity selling 2D barcode campaigns. A Sales Agent may simply resell codes or they may add significant value such as vertical industry expertise or service aggregation to support Code Publishers.

#### Sales Agent Responsibilities:

- Obtain codes for publishing from Campaign Managers
- Work with Code Publishers to develop a campaign that meets their mobile communication needs
- Obtain anonymous subscriber-volunteered demographic data and scan reporting data from Campaign Managers, to be shared with Code Publishers

### Reporting Functions Supported

Reporting data is important to the health and growth of the ecosystem and the many players within it, including Code Publishers. In some cases, a consumer may voluntarily provide demographic information via the code scanning client application. The client may then transmit the anonymous consumer data to the Central Clearing House, which may be passed through the ecosystem. The CCSAT supports sharing anonymous customer-provided demographic information throughout the 2D barcode scanning ecosystem where technology, legal statutes, and privacy policies allow.

#### **CTIA CCSAT Decision:**

Member carriers will strive to support the sharing of anonymous demographic information provided voluntarily by customers, so long as doing so occurs within legal, ethical and technical limitations. The following variables represent the demographic data that CCSAT would like to see available within the ecosystem:

- Age
- Zip
- Gender
- Household Income

In addition, all members will strive to support the following minimum Campaign information with ecosystem participants when technically, ethically and legally possible:

- Number of scans per campaign
- Number of unique user scans
- Date and time of scans
- Network of originating scans
- Handset Make and Model

### Campaign Manager

Campaign Managers design and execute 2D barcode campaigns. Other than the Code Publisher and/ or Sales Agent, the Campaign Manager is the only entity that knows the target action and content destination address of the code scan.

In the future, the team envisions having multiple Campaign Managers per code symbology. This type of interoperable, multi-vendor environment is essential for competition and growth of the market.

Campaign Manager Responsibilities (when designing a Campaign):

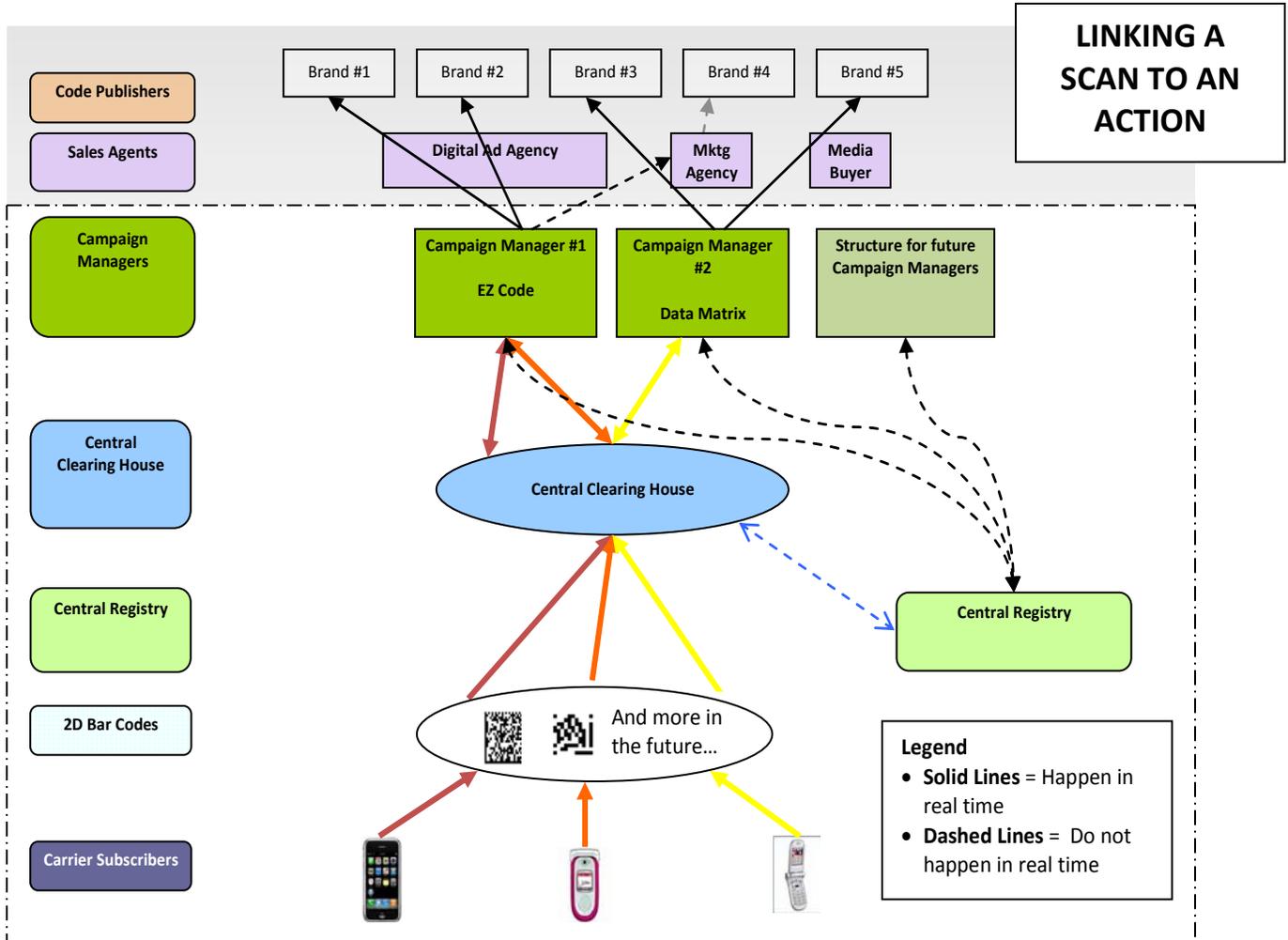
- Work with Sales Agents and Code Publishers to develop 2D barcode campaigns
- Provide professional services to enable 2D barcode campaigns, including consulting and technical support
- Report demographic and scanning information to Carriers, Code Publishers and/ or Sales Agents for each campaign as legally and technically appropriate

**CTIA CCSAT Decision:**

All member carriers will support an interoperable system of Campaign Managers to encourage competition and adoption.

## TECHNICAL ASPECTS OF ECOSYSTEM

The technical functions that link a 2D barcode scan to an action in the handset reside in the lower five levels of the architecture. The functional entities and technology involved include Campaign Managers, Central Clearing House, Central Registry, Code Reader Application, Carriers, and the CCSAT.



### Technology Overview

With the proliferation of camera-equipped cell phones, technology has emerged that allows phone-resident software to examine a barcode image and interpret the alphanumeric values it represents. The most common method uses downloadable or preloaded client software (*"code reader"*) that is launched and accesses the camera component. The handset screen becomes the camera view-finder for the user to view and center the code on the screen. Depending on the reader, the user either snaps a picture to initiate the client software interpretation process, or the image is interpreted automatically. In either case, when the software recognizes a supported code, it follows directions to accomplish a desired user experience.

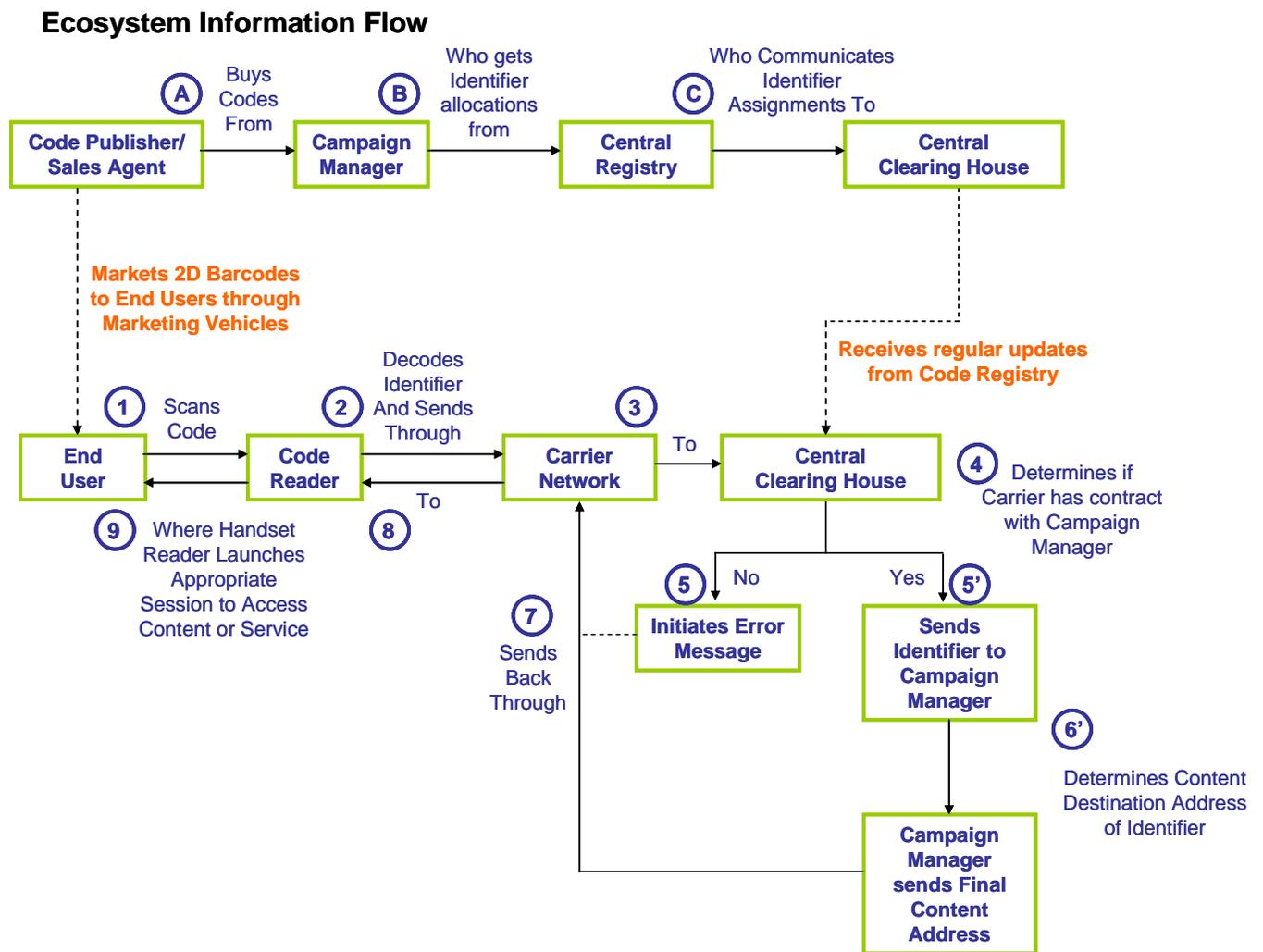
The device (client) software can provide results with or without the support of the network. In the **Direct** model, the client software interprets the code and delivers a result without calling upon the

network for further information. For example, a phone number might be embedded in the code, and the client software interprets it and presents it as a phone number ready to be dialed.

In the **Indirect** model, an alpha-numeric number (*'Identifier'*) is decoded in the Code Reader and sent over a network to a server for dereferencing. The resolved address of the intended content or service is then returned to the client software, which initiates an action in the device to launch the intended user experience. An example of this might be accessing a deep link on the mobile Internet.

**CTIA CCSAT Decision:**  
All member carriers will support the Indirect Encoding Model for 2D barcodes.

This paper focuses on the Indirect Model. The following Information Flow diagram depicts how a user's scan information flows through the 'Indirect' architecture of the ecosystem:



In the Campaign Creation and Management section discussed earlier, the campaign creation flows from Code Publisher to Campaign Manager. It is an offline process that does not occur in real time. In contrast, the real-time scanning process begins at the consumer handset (Step 1 above) and flows to the Campaign Manager (Step 6' above) and back, and occurs almost instantaneously.

The primary customers of the eco-system, the Code Publisher and the Carrier Subscriber, will not be discussed in this section. Service providers that support the ecosystem will be described in the following pages.

### Benefits of an Indirect Encoding Model

The Indirect encoding model offers several benefits over the Direct model, which are useful for consumers, Code Publishers and Campaign Managers. The following describes the main benefits of an Indirect encoding model:

- **Interoperability** - Indirect encoding allows multiple Campaign Managers to reach carrier subscribers through a single handset code reader application. The incorporation of a Central Clearing House and Central Registry enables Campaign Managers to use this system in an interchangeable, equal way, while maintaining the privacy and confidentiality of their company's 2D bar code campaigns.
- **Consistency of Service and Market Reach** -One key to adoption of 2D barcodes in the United States is consistency of service experience and reliability for customers, independent of carrier or camera phone make & model and choice of barcode symbology. Indirect encoding supported by a Central Clearing House function acting on behalf of carriers enables users to scan and decode different supported symbologies using a single code reader application on the handset. This fulfills a key objective of Code Publishers by ensuring a consistent experience to the broadest base of users and allows access to campaign content or service, regardless of their choice of Campaign Managers, carriers or symbologies.
- **Advertising Uses & Size** - The Indirect model encodes an alpha-numeric code (*'Identifier'*) into the barcode, rather than a full address of the intended content or service (i.e. WAP URL). This Identifier is used by the Campaign Manager as an index to resolve the full URL, which will be returned to the handset 2D barcode reader application for action. As a result of encoding a smaller amount of data, indirect barcodes are typically much smaller in size. A small bar code will be essential in usage situations with space constraints, such as on consumer goods packaging involving imprints on small objects.
- **Security and Trust** - The Indirect model ensures the security of content and a trusted user experience. This contrasts the Direct encoding of barcodes, which typically involves unmanaged routing of the user's client to the code publisher's web portal, hence exposing the user to potential inappropriate content, fraud, phishing and other attacks. With the Indirect model, system entities work collaboratively to ensure a trusted and managed user experience. Stakeholders are much better equipped to institute content guidelines for 2D bar code distributions and they can mitigate the adverse impact of misleading or inappropriate content on end users by removing the associated Identifiers from circulation.
- **Consumer Analytics Reporting** - The Indirect model enables system entities (Clearing House and Campaign Managers) to leverage carrier capabilities to report user demographics (on a opt-in and anonymous basis). These demographics are of value to Code Publishers for purposes of advertising accountability and campaign planning. As the 2D Barcode market and methods of user-controlled disclosure of application attributes (e.g. geo-location and subscription profile

data) mature, further opportunities exist to enhance the user experience and create possible follow-on service transactions with the Code Publishers (e.g. e-commerce).

## Code Reader Application

The Code Reader Application scans the 2D barcode and decodes a data string from the symbology. Next, it sends the unique Identifier, the Header, customer-provided demographic information and scan data to the Central Clearing House for processing. The Header will include information about the handset and carrier.

A single code reader application will support more than one code symbology. To facilitate common codes, the CCSAT group has agreed to include support for reading two symbologies in the initial code reader application: Data Matrix and EZ Code.

Code Reader Application Responsibilities:

- Scan and read both Data Matrix and EZ Code symbologies
- Send decoded Identifier and Header information to the Central Clearing House for partial de-referencing
- Potentially send Subscriber demographic data (if available) and scan data with each scan to the Central Clearing House

### CTIA CCSAT Decision:

All member carriers will support, at a minimum, the following code symbologies on their initial Code Reader Applications:

- Data Matrix
- EZ Code

## Central Clearing House

All scans in the ecosystem must pass through the Central Clearing House (CCH) in order to maintain consistency of service. The CCH is responsible to the CCSAT group. The CCH acts as a point of reference ('Gateway function') for all Campaign Managers and all participating Carriers in the ecosystem. Any participating Carrier can utilize the CCH to assist with auditing of scan data for each Campaign Manager. The CCH must therefore maintain records of scans sent from each Carrier's network to each Campaign Manager.

### CTIA CCSAT Decision:

The Central Clearing House will fulfill auditing functions for member carriers.

The technical flow is as follows: Once an Identifier is decoded in the Code Reader Application, the Identifier is sent with a Header, along with potential anonymous demographic information and scan data to the CCH server. The CCH server checks the Identifier against its database to find the assigned Campaign Manager. Then, the CCH determines whether the sending Carrier network has an agreement with the assigned Campaign Manager. If the Carrier does have an agreement, the CCH forwards the Identifier and all data to that Campaign Manager. If the Carrier does not have a contract with the Campaign Manager, the CCH will then send an "error" or "sorry" message back to the customer's handset.

Finally, the CCH is the entity that evaluates and permits Campaign Manager use of the ecosystem Service Mark. Therefore, the CCH will be required to sign and maintain policies of acceptable use with each Campaign Manager in the ecosystem. This topic will be further discussed later in the paper.

Central Clearing House Responsibilities:

- Responsible to the CCSAT group
- Maintain a database of Identifiers with their associated Campaign Managers

- Update database regularly with the Registry
- Check that the Carrier has a contract with the Campaign Manager that manages the Identifier
- If a contract is in place, send the Identifier to the controlling Campaign Manager with the Header, potential demographic information and scan data
- If a contract does not exist, or the Identifier is not registered, send an “error” or “sorry” message to the Code Reader Application
- All Header information must be sent to the Campaign Manager in a format identical to the way it is received
- Maintain and appropriately share records of scans sent from each Carrier’s network to each Campaign Manager for auditing purposes
- Ensure confidentiality of all scan, demographic and header information between Carriers and between Campaign Managers
- Maintain and enforce acceptable use policies with each Campaign Manager on behalf of the CCSAT group

**CTIA CCSAT Decision:**

All member carriers will support having the Central Clearing House maintain acceptable use policies with Campaign Managers. Content guidelines for this policy will be determined by the CCSAT group.

**CTIA CCSAT Decision:**

All member carriers will support utilizing the Central Clearing House as the point of assignment of the ecosystem Service Mark.

## Central Registry

The Central Registry is the authority responsible for managing the creation and dissemination of unique Identifiers to Campaign Managers. The Central Registry is envisioned to be a neutral, independent third party that allocates Identifiers in a standard way and has reporting responsibility to a neutral governing body such as the CTIA. The Central Registry should provide an online lookup facility for all registered codes to authorized parties, such as the Central Clearing House. Finally, the Central Registry may also push updates to the Central Clearing House database and may support the online registration of codes.

**CTIA CCSAT Decision:**

All member carriers will support a central registry authority. Campaign Managers obtain Identifiers from the Central Registry.

### Central Registry Responsibilities:

- Create unique Identifiers for use in the 2D barcode ecosystem
- Disseminate the Identifiers in a structured, consistent manner that is neutral to all parties
- Maintain a database of Campaign Managers and the Identifiers they control
- Provide access to the database to authorized parties including the Central Clearing House
- Update the Central Clearing House’s database regularly
- Convert all current and new Identifiers to conform to the International standard Identifier when it becomes available

## Campaign Manager

In the 2D ecosystem, Campaign Managers play a dual role as a sales entity and a technical enabler. In order to technically enable campaigns, Campaign Managers must coordinate services with the Central Clearing House, Central Registry, Carriers, and Code Reader Applications.

Once a Campaign Manager’s server receives an Identifier from the Clearing House server, the Campaign Manager will check the Identifier against its database to determine the final destination address of the

content. The Campaign Manager then sends the destination address information of the content to the subscriber's code reader application through the Carrier network.

Campaign Manager Responsibilities (when acting as a technology provider):

- Procure Identifiers from the Central Registry for use in campaigns on behalf of Sales Agents and/or Code Publishers
- Convert the Identifiers into graphical 2D barcodes
- Receive an Identifier from the Central Clearing House and determine the destination address of the content for the associated Identifier
- Send the appropriate destination address and action directions back to the code reader application
- Agree to support common content guidelines with the Central Clearing House
- Once content guidelines are supported, use the Service Mark where appropriate
- Solicit Carriers to partner with in the ecosystem

## Carriers

The carrier owns the cellular network that facilitates the movement of 2D barcodes. The carrier selects and maintains the Code Reader Application for handsets. Carriers work with Campaign Managers and the Central Clearing House to facilitate the movement of 2D barcodes.

Individual Carrier Responsibilities:

- Select and maintain Code Reader Applications for handsets
- Maintain 2D barcode reader capable handsets
- Select Campaign Managers to work within the ecosystem

## CCSAT Group

The CCSAT works under the coordination of the CTIA to enable the 2D barcode market in the US. The CCSAT will continue to coordinate efforts with regard to the Central Clearing House, Central Registry, initial symbologies, and application of the Service Mark.

Beyond the current member carriers additional carriers are encouraged to join the CCSAT group. In doing so, the carriers will be responsible for supporting agreed upon levels of carrier service and support for 2D barcodes as outlined throughout this whitepaper, in addition to the responsibilities noted below.

CCSAT Group Responsibilities:

- Create and administer RFPs for the Central Clearing House, Central Registry, initial open standard Campaign Manager, and Service Mark
- Create SLAs for the Central Clearing House and Central Registry
- Periodically administer RFPs for the Central Clearing House and Central Registry
- Create guidelines for Service Mark usage
- Agree to acceptable use content guidelines, which will help define use of the Service Mark
- Create and maintain an informational website for the 2D barcode ecosystem in the US
- Maintain contact with international standards bodies to ensure coordination with international conventions for 2D barcodes over time

## CODE SYMBOLOGIES

There are hundreds of symbologies to choose from. Some considerations for symbology support include:

- Whether the symbology can be accurately interpreted using the optic capabilities in camera-enabled handsets in the US market.
- Whether the code is “Standard.” The International Organization of Standards has defined standards for a sizeable subset of barcodes available in the market.

The initial Code Reader Application will support two code symbologies, while maintaining flexibility to support additional symbologies as standards and the market evolve. Any client application **used by CCSAT carriers at Introduction** will support both EZ Code and Data Matrix symbologies with Indirect access through the Central Clearing House.

### Why two symbologies?

Carrier cooperation in support of code symbologies is crucial for widespread adoption, which is evident from international use cases. However, the importance of a multi-vendor, interoperable market in North America is also critical to encourage competition, innovation and adoption over time. In order to establish the foundation of a multi-vendor environment, the initial business model for 2D codes in North America supports both an open ISO standard code and a proprietary code. In the future, additional code symbologies will be added according to an established process described later in this document.

### Why EZ Code and Data Matrix?

In general, proprietary code symbologies allow Code Publishers, Campaign Managers and carriers to control code usage and prevent abuse. EZ Code is the first proprietary code chosen by the CCSAT. The symbology was successfully tested to support indirect access in a North American CTIA cross carrier trial.

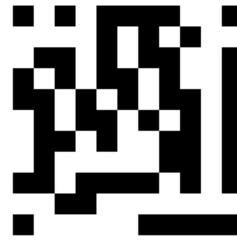
In an effort to encourage open competition and set a foundation of interoperability, the CCSAT group has also chosen to support Data Matrix, an ISO supported standard code. The Data Matrix code requires no license fees or permissions due to its ISO standard status.

When a Campaign Manager obtains a Data Matrix or EZ Code Identifier from the Central Registry and adheres to content guidelines, the Campaign Manager will have the option to publish the Service Mark alongside the 2D barcode. The Service Mark will support the camera-phone scanning consumer education process and enhance confidence in the code’s reliability. The appearance and placement of the Service Mark has not yet been determined.

## Data Matrix Symbology



## EZ Code Symbology



## Implementation Plan

The team desires to foster both open standards and proprietary solutions. An initial campaign manager and symbology are being selected for each as a way to encourage market growth and adoption. The initial solutions should not be interpreted as the only solutions supported over time. They simply represent the symbologies being supported with the first release of the cross carrier downloadable device reader software. In the future, the team envisions supporting multiple code symbologies and multiple Campaign Managers per code symbology.

## DEVICE SUPPORT

The CCSAT group acknowledges that rapid growth of supported devices is critical to promote adoption of 2D barcodes in the United States. Therefore, the group will target as many devices as possible to support barcode scanning in the near term. Over time, the number of supported devices should continue to grow.

The minimum technical requirements for devices to support Mobile Barcode Scanning are:

- Ability to preview the 2D barcode on the cell phone screen. The display requires at least a QVGA display (320x240), with better performance on a VGA resolution (640x480).
- Capture the 2D barcode through a user-initiated operation or automatically process while reviewing the image. In general, OS-level software handlers are necessary for external applications to manage the handset-based camera.
- Ability to process the image that was captured by the application. Once the processed information is received by the phone it should be capable of letting the application open functions such as browsers, text messaging platform and the calendar application.

## Downloading the Reader

The reader will be available from download sites during the second half of 2008.

## TIMING OF ECOSYSTEM AVAILABILITY AND RFPs

The following schedule includes development and launch of Central Registry, Central Clearing House and initial Data Matrix Campaign Manager RFPs.

Tentative Dates	Event
<b>September 2008</b>	<b>Complete RFP Designs for:</b> <ul style="list-style-type: none"><li>• Central Registry</li><li>• Central Clearing House</li><li>• Data Matrix Campaign Manager</li></ul>
<b>October 2008</b>	<b>Issue the three RFPs</b>
<b>December 2008</b>	<b>Collect RFP Responses</b>
<b>January 2009</b>	<b>Inform Finalists in each area <i>(Some vendors may choose to bid in multiple areas depending on their interests and services)</i></b>
<b>February 2009</b>	<b>Finalist Presentations</b>
<b>July 2009</b>	<b>Deployment of Central Registry, Central Clearing House and Data Matrix Campaign Manager</b>

Additional information about the RFP process will be posted at [www.ctia.org](http://www.ctia.org) as it becomes available.

### CROSS CARRIER RFPs, GUIDELINES AND SERVICE MARK

In order to encourage market advancement, the CCSAT is developing and delivering several RFP's to identify parties that desire to help grow a code scanning ecosystem in the United States.

#### Open Standard Campaign Manager RFP

Following analysis and participation in standards organizations, the CCSAT selected Data Matrix as the first open standard symbology to support. One CCSAT goal is to support other open standards as they become available and to allow the market to drive which solutions take a leadership role over time. The team is launching a RFP to help identify a Data Matrix Campaign manager that can help develop the open standard solution in the near term.

The carrier group will simultaneously lay groundwork for additional Campaign Managers associated with Data Matrix.

- Campaign Managers can apply to the CCSAT to become part of the ecosystem. There will be periodic reviews of Campaign Manager applications on a schedule in line with the number of interested participants.
- Campaign Managers will negotiate terms directly with individual carriers to determine the conditions under which the codes it manages will be resolved. This negotiation will generally occur at a universal level rather than campaign by campaign.

## Central Clearing House RFP

In order to start the market with a cost effective solution, a Central Clearing House will be deployed that links each carrier to the code scanning ecosystem.

The Central Clearing House will be designed with the intention of supporting additional carriers over time. When carriers are ready to deploy scanning-enabled handsets, they can participate in the Central Clearing House ecosystem by:

- Supporting technical specifications developed by the Central Clearing House (which have yet to be defined)
- Entering into contracts with individual Campaign Managers
- Agreeing to abide by the guidelines established by charter members of the CCSAT

## Central Registry RFP

Critical to the open nature of the market is the ability for multiple players to acquire codes in an organized and unbiased manner. Therefore, a Central Registry will be deployed that will enable all participants to obtain unique Identifiers in a coordinated manner.

## Additional Symbologies and New Technologies

The CCSAT acknowledges the high rate of change in the code scanning space and the need to evolve as technology and market needs change. The CCSAT will conduct ongoing analysis and sensing of market conditions, and will maintain correspondence with global organizations concerned with code scanning.

Some decisions may require widespread infrastructural change, and therefore may not be adopted frequently. The team plans to consider symbology expansion, strategic direction, and other significant infrastructural considerations on a periodic basis.

## Marketing Guidelines and Suggestions

In order to support market growth, a Marketing Best Practices Guide will be published following this whitepaper. The guide will be created in conjunction with other industry organizations and will provide marketers with details including:

- How to procure codes
- Distribution of downloadable code readers
- Content guidelines
- Example use cases and case studies

## Service Mark Development

A Service Mark will be created to provide consumers with assurance of a consistent and known experience when they scan registered indirect barcodes that are associated with the Service Mark. The Service Mark will be used to educate barcode scanning users about reliability with the intent to encourage an increase in overall scan frequency. This will help consumers identify the Service Mark and associate it and the barcode with positive, reliable results. The service mark will be further defined in the upcoming marketing paper.

## BACKGROUND MATERIAL AND REFERENCE

### BENEFITS OF CROSS CARRIER SUPPORT

The CCSAT held several key governing values when researching, defining and recommending a proposed solution. Key factors include:

**Inclusiveness**- Primarily refers to: a) the need for a widespread and common deployment across devices. b) The importance of an open market with inclusion of future players. c.) Ongoing effort to provide the experience across carriers, handset operating system and handset optics.

**Simplicity** – Making it simple for code consumers and code publishers to participate in the space.

**Modularity** – Allowing for competition in the market by fostering multiple players throughout the ecosystem.

The main benefits of the nationwide carriers jointly supporting the program are:

- To enable codes to work ubiquitously across operators and devices
- To successfully reconcile codes both in a subscriber's home market and out of network
- To improve consumer education and adoption by providing a consistent interface
- To accelerate the growth of a new model for marketing and advertising opportunities within the mobile space
- To eventually become globally interoperable
- To improve the overall customer experience

### MARKET DRIVERS

Camera-phone barcode scanning (code scanning) will be successful when large numbers of code publishers use the medium to reach an audience, and the intended audience uses the medium frequently to fulfill a variety of needs. For widespread use to occur, the infrastructure should be sufficiently flexible to support a wide range of publishers and consumers.

Some markets have achieved significant use of code scanning. One example is Japan where 76% of the population is familiar with camera-phone based barcode scanning according to a carrier-sponsored study by IPSOS in August, 2007. According to the study, the Japanese youth market provides the heaviest percentage of users with 65% of young males and 48% of young females using the service within the 3 month period prior to the study. Other demographics showed the most dramatic growth in the most recent year. The most common usage frequency found in the study was once per week scanning.

The CCSAT spent a significant amount of time studying and learning from the code scanning experiences in other countries and have drawn the following conclusions:

- Mass-markets can develop where carriers coordinate on technology implementation (Japan) and are hampered when carriers do not coordinate (Korea).
- When carriers play no active role, the market can easily fragment, creating confusion for consumers. (Philippines, Europe).
- Camera optics in the US trails those in Japan, including the deployment of macro-lens, zoom lens, and densely pixilated cameras. This drives the need for visually simple symbologies.

## STANDARDS ORGANIZATIONS

The following standards organizations are involved in the Mobile Barcode scanning market and technology standard development.

### Open Mobile Alliance (OMA)

Open Mobile Alliance (OMA) is responsible for the delivery of technical specifications for application and service frameworks, with certifiable interoperability. OMA does not define the application or service itself, but rather defines the framework for developing applications and services.

OMA has undertaken a Mobile Barcode Work Item to address the view that 2D and 1D barcodes have emerged as a promising enabler of the mobile Internet in some markets. However, there is still a lack of interoperability between different markets and players. The majority of consumers are unlikely to adopt mobile barcode technology before it comes pre-installed on a large variety of devices and offers easy interoperability between different service providers.

The OMA work will include recommendations of: choice of 2D barcode symbology(ies); the data stored in the barcodes; and, terminal behaviors in response to reading barcodes, including behaviors with respect to some existing (1D and 2D) barcodes. Architecture and protocols for interoperable components will be defined to support network-assisted resolution of 1D and 2D barcodes. The standards are expected to be finalized by the end of 2009. CCSAT members agree that support of an international standard via the open standard code is a long term objective.

OMA published a upcoming whitepaper ('OMA Reference Release') on Mobile Codes in review in mid June 2008, which can be accessed at:

[http://www.openmobilealliance.org/Technical/release\\_program/mc\\_v1\\_0.aspx](http://www.openmobilealliance.org/Technical/release_program/mc_v1_0.aspx)

### ISO

The International Organization for Standardization (Organisation internationale de normalisation), widely known as ISO, is an international standards-setting body (Wikipedia). 2D bar code standardization activities within ISO are the responsibilities of JTC 1/ SC 31/ WG 2:

JTC 1 – Joint Technical Committee of ISO and IEC (International Electrotechnical Commission) number 1 on Information Technology Standards

SC 31 – Subcommittee 31 on Automatic Identification and Data Capture Techniques

WG 2 – Working Group 2 on Data Structure

[http://www.iso.org/iso/standards\\_development/technical\\_committees/list\\_of\\_iso\\_technical\\_committee/iso\\_technical\\_committee.htm?commid=45332](http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committee/iso_technical_committee.htm?commid=45332)

Three ISO-standardized 2D bar code symbologies have the capacity to encode both direct and indirect mobile code message formats. In addition, they include robust error correction capability to ensure a high first-read rate and they have mature and efficient image processing and decoding algorithms. Together, these three standard bar codes provide a sound basis for global interoperability and represent the vast majority of all mobile codes in used throughout the world today. These are:

- ISO/IEC 16022 (published in 2006)  
Information technology -- Automatic identification and data capture techniques -- Data Matrix bar code symbology specification.
- ISO/IEC 18004 (published in 2006)  
Information technology -- Automatic identification and data capture techniques -- QR Code 2005 bar code symbology specification.
- ISO/IEC 24778 (published in 2008)  
Information technology -- Automatic identification and data capture techniques -- Aztec Code bar code symbology specification.

#### DATA MATRIX CODE

Data Matrix is covered by an ISO standard, ISO/IEC16022—International Symbology Specification and is in the public domain, which means it can be used free of any licensing or royalties. Data Matrix symbology claims space efficiency and can be printed as a square or a rectangle. Its physical structure facilitates robust image processing and reliable reading (based on Reed-Solomon error correction in combination with the code structure). Data Matrix has been implemented in diverse applications covering much of the automatic identification industry. [http://en.wikipedia.org/wiki/Data\\_Matrix](http://en.wikipedia.org/wiki/Data_Matrix)

#### GS1

GS1 is a leading global organization dedicated to the design and implementation of global standards and solutions to improve efficiency and visibility in supply and demand chains globally and across sectors. The GSI has released a comprehensive whitepaper covering Mobile Commerce opportunities and challenges with a focus on camera-phone barcode scanning. More information can be found at [www.gs1.org/mobile](http://www.gs1.org/mobile)

#### GSM Association (GSMA)

The GSM Association (GSMA): GSMA is the global trade association of the GSM operators in the world. The GSMA 2D barcode Ps project was started in Fall 2007 to fast track the industry guidelines and prevent market fragmentation. The GSMA will also be publishing a White Paper to document the operator views and requirements. The group members have agreed in principle that the Operators will pursue Indirect Codes. They intend to coordinate their work in progress with the OMA to ensure that the standards are globally applicable. [www.gsmworld.com](http://www.gsmworld.com)

#### Mobile Marketing Association (MMA)

The Mobile Marketing Association is a global non-profit association that strives to stimulate the growth of mobile marketing and its associated technologies. The MMA has over 650 members representing over forty countries. MMA members include agencies, advertisers, hand held device manufacturers, carriers and operators, retailers, software providers and service providers, as well as any company focused on the potential of marketing via mobile devices. The Mobile Commerce Committee has begun work on a 2D Barcode Style Guide designed to help agencies and brands in their effort to begin offering 2D Barcode programs. [www.mmaglobal.com](http://www.mmaglobal.com)