ASSET TAGGING eBOOK

A practical guide for tagging hardware and other fixed assets

AMI

Overview

Most of our customers are introducing or significantly enhancing their IT asset management process, and barcode or RFID labels, also called "asset tags", are often part of the discussion. This document is intended to show the various options that are available for barcode labels, including:

- Pros and cons of undertaking a new asset tagging effort
- Material/cost choices for the asset tag labels themselves
- Designing the numbering scheme for the labels
- Label recommendations
- Label placement

If you elect to proceed with asset tagging, AMI can assist on designing the labels, supplying them, and maintaining the numbering scheme so that uniqueness is maintained across resupply orders. Regardless of who provides the tags, there are things you should know about them.

To Tag or Not to Tag?

Assets must be uniquely identified, quickly, accurately, and consistently. There are two basic schools of thought:

1. Rely on manufacturer serial numbers and avoid implementing your own tags
2. Implement your own asset tags
   a) Affix the tags yourself
   b) Have your manufacturers/vendors affix the tags before they ship

Option #1 is a gamble... a gamble that some of our largest customers choose to take. They save the cost and process complexity of tagging, but they also pay the costs:

- **Data Quality.** Since there is no uniform pattern to serial numbers, you can't be certain that your data is 100% accurate. You can't really be sure whether the serial number was scanned or the service tag (or some other barcode) was scanned instead accidentally. This is discussed in more detail later in this document.

- **Tag accessibility.** Manufacturers often put their serial numbers in the most inconvenient possible place for an inventory/audit sweep:
   ◦ Behind desktop computers where you're climbing under a desk to find the tag in the dusty dark. Often, these are very small and multiple barcodes are stacked together.

- Behind rack-mounted servers where humans often can't access
- On the bottom of laptops where users must be interrupted and/or undocked to access the tag and very inconvenient when laptops are stacked in a storeroom
- Behind the battery of a mobile device

- **Tag Identification:** Many manufacturers place multiple barcodes on equipment, e.g. Serial number, part number, service tag number. Worse, they're often right next to each other, inviting a data collector to scan the incorrect tag.

- **Uniqueness:** Lastly, serial numbers are not globally unique, so given an asset environment with diverse manufacturers and assets counts over 100,000, it's possible to run into duplicate serial numbers. For a smaller installation, this means a headache for the asset manager who has to analyze and scrub the data. For a larger installation, it can really gum up the works as hundreds of as sets appear to change from one model to another on a regular basis.

Option #2 avoids these pitfalls, but at the cost of process complexity:

- You may want to undertake an up-front tagging effort to tag all of your existing, deployed assets

- Moving forward, there will be an additional step, usually receiving or imaging, where assets must be tagged. Moving this burden to the equipment vendor is a common approach to reduce the impact to your teams.

If there is energy and budget to undertake the initial baseline tagging effort, we recommend that approach so the all assets are properly tagged and enrolled in the asset repository.

Choosing the Right Asset Tag

Labels can be customized almost as much as you want, from the materials, color, adhesive, format of data, barcode and RFID inlays….you name it. There are many barcode manufacturers that can create custom labels in any quantity you need.

Label Features

The following features affect the performance of your labels and their cost. Typically, AMI works with you to understand your requirements and make a recommendation.

Material

Labels come in just about any material you can imagine.

- Die-cut paper (store-bought DIY asset tags): Inherently not durable; ink not protected from scratching or fading
- Polypropylene: Cheapest non-DIY option, primary drawback is its low temperature rating
- Polyester: Standard material for indoor environments
- Durable polyester: Suited for outdoor environments
- Aluminum: The most durable and expensive material available

Adhesive

You need to know what you need to stick to in order to select the right adhesive. For example, asset tags made for the fire department use an "outdoor adhesive" that is designed to stick well to metal, plastic, and even semi-porous material and can withstand heat, water, and rough handling very well.

Laminate

The ink on the label must be protected in some way, or else it will fade, scratch, or smear.

- Polypropylene (gloss or matte - matte is always more expensive but enables easier scanning via smartphones as glossy laminates can make focusing difficult)
- Polyester (gloss or matte)
- UV Polyester: Affords additional durability against fading over time
- Polycarbonate (lexan plastic): Puts a plastic-like matte shell on the label and makes it extremely rugged

Security Features

- "Destructible" polyester labels will rip if someone tries to remove them. Unfortunately, in order to be destructible, no laminate is applied to them, so they're not durable and poorly suited to asset management.
- VOID labels: If you attempt to remove a label with this feature, the label will show the word "VOID" on it and leave the word "VOID" in adhesive residue on the surface to which it was attached.

Color

Using color is recommended because it lets your data collectors, frequently temporary workers with limited training, rapidly distinguish your asset tags from other labels that may be on the asset. Using additional colors (in addition to black) is approximately $100 per color per tag run.

Recommendation

For typical IT asset scenarios, we recommend a standard two-color durable polyester label with a protective laminate coating and a high-tack adhesive. We do not recommend glossy, shiny labels as those can be difficult to scan using camera-based barcode scanning on smartphones.

Dispensing

- Labels generally come in rolls vs. sheets, and you can specify the number of labels per roll in chunks of 500. We recommend rolls of 2000 labels or less. Above 2000, you run the risk of the roll being wound so tightly that the adhesive is squeezed out from under the label, which would result in dispensing problems. The optimal number of labels per roll is usually a function of the number of tagging stations.
- Dispensing options are either:
  - Just the roll itself
  - A dispenser that is conceptually a big scotch tape dispenser (Max 5000 labels per roll)
  - An applicator gun (not really suited to ITAM)
- 3" is the standard diameter of the roll core, so most dispensers support this diameter. If you're using a special dispenser or applicator gun, however, you should verify the supported core sizes.
- There's no real science to picking a dispenser. Simply googling "label dispenser" and picking one that looks good and will support your label size is fine.

Barcode Numbering Options

It is important that you design your asset tag numbering correctly. AMI has witnessed many failed asset tagging efforts due to poor planning. Follow these guidelines to ensure maximum benefit and lifetime of the tags you use.

Numbering Concepts

Uniqueness

Above all else, an asset's identifier should be globally unique. Old numbers should not be reused. Whatever numbering scheme you choose must ensure global uniqueness over time.

Meaninglessness is good

Customers are often interested in embedding business meaning into barcode values, like embedding cost centers, asset types or other information into the numbering scheme. This may seem like a good idea, as it gives information about the asset just by reading the number, but it's not. See our blog post [Don't Make Your Barcodes Tiny Databases](#) for our reasons why.

For example, "V00391399-01" can express in a human-readable way that:

- The V prefix designates that this is an asset leased from our managed services provider, not a company-owned asset
- The first three numbers (003) designate the deployment type, i.e. that it's used by field operations and is subject to higher security requirements
- The last two numbers (01) designate the budget/department code of the asset

The problem with "burning business information into the tag" is that the information can change.

The asset can be purchased from the leasing company or transferred to a different department, or the numbering scheme can be abandoned and replaced by another scheme that works differently. These situations can invalidate the business meaning or worse, require the identifier to change. The idea of an identifier changing over time is a horrifying concept for data managers.

Thus we recommend that the identifier be a meaningless unique pointer to information in the master database. Use software to retrieve information about the asset from a database, vs. using information in the tag itself.

Simple sequence vs. distinct patterns

A simple sequence that monotonously increments by one is perhaps the most common numbering system that people use. Strictly speaking, there's nothing wrong with this kind of scheme as long as the numbers are unique, but it lacks many advantages below.

Establishing a machine-recognizable pattern for barcodes has a number of benefits. A pattern can be a simple structure, like "A0000485" which is described as "A followed by 7 digits". The main requirement for the pattern would be that it's sufficiently distinct, i.e. a hardware manufacturer would be highly unlikely to generate a serial number value that also used the same pattern. AMI recommends the pattern above for asset tagging.

Examples of numbering schemes

An example of a numbering scheme that produces values that are not distinct enough is simple 10-digit number with no pattern, e.g. 1239483837. If you used this kind of scheme for your asset tags, there would be no way for a machine to confidently know that it's an asset tag; it's highly likely that you'll run into manufacturer serial numbers, PO numbers on packing slips, old labels, etc. that use this simple scheme.

An example of a numbering scheme that produces values are distinct enough: "A followed by 7 digits", e.g. "A0000485". It is very unlikely that some other process would've generated this value, therefore the pattern is sufficiently distinct.

Benefits of a defined numbering scheme

Once you have a distinct pattern to work with, you have the following advantages:

- Your data entry software (i.e. AssetTrack) is faster and more accurate. Consider that barcodes are often located in dark, inconvenient places, often placed tightly with other barcodes (serial number, service tag). AssetTrack can be taught to detect your pattern(s) when they're scanned, and the value will be plopped into the correct field. Without a pattern, it's incumbent on the data entry user to tell AssetTrack what the next scanned value will be, since AssetTrack cannot distinguish between asset tags and serial numbers. This usually means that the user must scan barcodes in a set sequence (e.g. first serial number, then asset tag). With a pattern, the user can scan quickly in any order without looking at the screen and rely on AssetTrack to do the right

thing with the scanned data.

- Your data scrubbing/integrity/audit process can immediately find non-conforming data that has accidentally leaked into the asset tag field.

Check digits

Check digits is a loose term that we use to describe numbers that are generated by a predefined mathematical formula so that any given number can be absolutely determined to be valid or invalid.

Your credit card number is an example – if you are one number off, the result will likely be an invalid, unusable number that must be corrected in order to proceed. Put simply, when entering data, the scanner is never wrong, but humans often are; check digits help prevent human "fat fingering" errors.

Unlike distinct patterns, however, a barcode that uses check digits doesn't necessarily yield a distinct pattern – It's just a string of digits that could be an asset tag or serial number. MOD137 is one particular check digit formula that we recommend - see the appendix for the algorithm.

Symbology

There are about fifteen common barcode symbologies, and each one specifies the width of the bars, character set, and other details. Of these, we recommend Code 128 or QR codes. They are widely supported and have excellent density and scanner readability.

Keep in mind that the symbology you select will depend heavily on the type of readers you use. For example, a smartphone camera will not easily read a small 1D barcode. Likewise, a standard laser reader will not read a QR code.
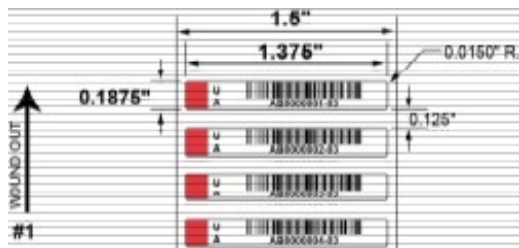
Label Recommendations

AMI recommends the following tags for server, data center applications.

Numbering Concepts

Standard Server Label

1875" high, 1.375" wide barcode label tag fit on most rack-mounted equipment. Requires an imager or laser scanner to read. Will not read via an iPhone or Android camera-based scanner easily.

Rat-tail Label

For items that do not have face real estate for a sticker label, a rattail option is available. Loop the tail through a perforation in the tag which will "hang" off the front of the asset. 1D or 2D barcodes including QR codes can fit on rattail tags, enabling scanning by any device.
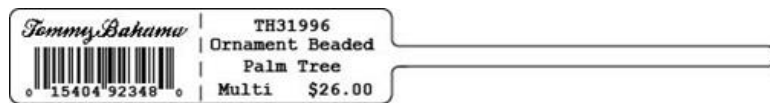
RFID Labels

AMI recommends Confidex Steelwave Micro or Omni-ID Prox NG RFID labels for barcode/RFID hybrid tagging of racked assets. RFID labels greatly improve data center auditing speed and accuracy by enabling scanning without line-of-sight. Each tag below provides a hole for zip-tying tags to assets that lack sufficient faceplate real estate.

AMI recommends tags are pre-programmed and labeled with matching barcode values to enable scanning by either barcode or RFID readers.

Numbering

The best of all worlds is something that implements both distinct patterns and a check digit, and is encoded to the label using Code 128 symbology. For example, AC10100015, which can be described as "AC followed by an 8-digit MOD137-compliant number".

Label Placement

Labels should be placed on hardware so that they can be read and scanned without interrupting users that are using it or needing to move them. Consider common situations that they might be in, like deployed in an employee's office, in a server rack, or stacked up with many other assets in a storeroom.

- Front of desktop workstations. The top of the workstation can sometimes be difficult to reach if many desktops are stacked in a storeroom.
- Top or front of laptops. Again, consider what will be exposed when many are stacked. Also consider that many users use docking stations, and having to undock a laptop to scan a label.
- Front of servers. When racked, getting behind servers can be difficult.

For more detail on process (e.g. when in the process to label equipment) please refer to the AMI Asset Tracking Guide

Given the number 10100015, the MOD137 check digit verification algorithm uses at the last digit (5) as the check digit, then starts with the second-to-last digit iterates through each of the digits, multiplying the "current" digit by 1, 3, or 7 in turn:

1 x 1 = 1
0 x 3 = 0
0 x 7 = 0
0 x 1 = 0
1 x 3 = 3
0 x 7 = 0
1 x 1 = 1

Then sum all of the products together (1+0+0+0+3+0+1 = 5). This number must equal the check digit of the original number. In our case it does, so 10100015 passes MOD137 validation.

In this case, the sum is a single-digit number (5) but if the sum is multiple digits in length, you would take *only the last digit.*

About AMI

Established in 2003, Asset Management International (AMI) provides barcode and RFID asset tracking solutions that help companies receive, track, audit, and report on assets to make informed decisions with confidence. AMI's flagship product, AssetTrack, uses cutting-edge data capture and reconciliation technology to maintain accurate asset data organization-wide. AssetTrack is used as a stand-alone comprehensive IT asset management solution as well as alongside industry leading vendors including ServiceNow, Hewlett Packard Enterprise, and Computer Associates. Headquartered in Seattle, Washington, AMI serves enterprise clients throughout the world including United States, Canada, United Kingdom and Australia. Visit www.amitracks.com for more information.

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