

Chapter 3

General Architecture of E-Postage Systems

3.1 E-POSTAGE DEVICES

E-postage devices help mailers to figure the correct amounts of postage for their mail pieces, compile the respective data representation of required imprints, and provide robust printing mechanisms to apply the respective imprints onto the mail pieces in the correct location. Peripheral devices such as folders, inserters, sealers, feeders, scales, sorters and stackers may be connected to e-postage devices to better integrate their core metering functions into the mailer's business processes.

The core metering functions provided by an e-postage device are listed below:

1. **Enter Mailing Parameters:** In the simplest case, the mailer types in the required amount of postage manually. Most of the mail pieces are franked with only a few different postal rates anyway, which mailers can usually remember.

More and more postal operators require e-postage devices to collect statistical data about which postal products they have franked (see Section 2.3.2 on page 43). These postal operators do not want mailers to enter postage amounts, but the exact rate categories or product codes. Since those may be inconvenient to remember and type, modern e-postage devices let mailers enter the characteristic mailing parameters (see Section 2.3.1.1 on page 41) and calculate the rate categories and the corresponding postage amounts automatically. This approach is called *product code entry*.

2. **Account for Imprint:** Once the correct amount of postage is determined, an e-postage device must account for it. Accounting is the irreversible process of deducting the requested amount of postage from the prepaid amount of postage currently remaining in the mailer's e-postage device.
3. **Apply Imprint:** Once an e-postage device has determined a rate category and accounted for its postage amount, it must produce the

respective imprint and apply it to the prepared envelope or label of the intended mail piece.

4. **Report Activity:** After an e-postage device has performed local or remote activities, it needs to report so to its e-postage provider during the next scheduled time slot. Such reporting includes to submit its usage data if the postal operator so requires.

Ideally, the imprints should be accounted for in the exact same moment when they are applied. This would guarantee that mailers never receive unaccounted for imprints (bad for the postal operator) nor ever miss imprints that have been accounted for (bad for the mailer). Real e-postage devices must fail safe in case of failure, technical or human, by accident or intentional. Because such failure might interrupt an e-postage device's operation at any time, imprints are always accounted for *before* they are printed out. So if failure strikes, it can only lead to missing imprints that have already been accounted for. It is conceivable that such a case will be followed up by the mailer who would otherwise bear the loss.

3.1.1 Closed Offline E-Postage Devices

Closed offline e-postage devices are specialized embedded systems dedicated to download and store electronic postage and to produce imprints on demand of the user. Most postal operators require offline e-postage devices to have postal security devices embedded. A postal security device is a tamper resistant and tamper responsive hardware security module that hosts and controls all postal revenue sensitive functions of its e-postage device.

A schematic block diagram of a closed offline e-postage device is shown in Figure 13 on page 53. It contains a main processor (CPU) that is connected by a data and address bus to a number of non-volatile and random access memory components, to the postal security device, and to a co-processor. The co-processor supports the control links to a number of specialized controllers for the keypad, scale, chipcard reader, printing system, modem interface, sensors, motors, power control and to one or more serial interfaces. The chipcard reader allows customers to load and store their personal meter configuration such as adverts or cost accounts on a personal chip card. The modem links the e-postage device to the e-postage provider. The sensors and motors control the electromechanical parts of the e-postage device including the letter transport, bringing the print head to its print position and back to the rest zone, and cleaning facilities. Optional serial interfaces are useful to connect an external scale, a service PC for diagnosis and maintenance, or the user's desktop PC to facilitate the configuration of an e-postage device. Additional controllers link