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Signing Electronic Tax Returns with PenOp

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Until now, when a taxpayer files a tax return with the Internal Revenue Service electronically, it has been required that she sign a separate paper form, form 8453, as an authentication of the return. The paper 8453 form, which summarizes key parts of the tax return, then must be mailed to the IRS. The reason for the paper is that there was no electronic authentication device as effective and convenient for taxpayers as the ink signature. Now, in a bid to eliminate paper entirely, the IRS is accepting electronic authentications for some returns.

How The System Works

After a tax preparer (like H&R Block) assembles a tax return for electronic transmission to the IRS, the preparer displays to the taxpayer an electronic 8453 form on a computer monitor. The taxpayer then authenticates the form by picking up a pen or stylus and signing her autograph on a digitizer pad attached to the computer.

The digitizer pad coordinates with the PenOp(r) software, which captures a bitmap image of the signature (somewhat like an image on a fax) as well as statistical measurements of the signing event. These statistical measurements -- known as biometric measurements - - record the unique behavior that any individual exhibits when signing his autograph, such as the speed, angle, and grace with which the various loops, lines, and crosses of the autograph are imparted.

PenOp is the digital descendant of ink on paper, and it aims to do the same thing ink does. PenOp's developer maintains that the biometric measurements, in combination with the captured bitmap, store evidence of the signature similar to the evidence stored by marks on paper. In other words, the developer believes it can demonstrate that a qualified handwriting expert can be just as effective judging the authenticity of a signature captured with PenOp as he would be judging the same signature inscribed in ink on paper. Handwriting analysis, of course, is an imperfect art, and there is no guarantee PenOp's measurements will be accepted as credible evidence in court, just as there is no guarantee that any given ink-on-paper signature will be accepted.

When the taxpayer signs with PenOp, the biometric measurements are cryptographically united with a hash summary (or mathematical digest) of the 8453 form, thus forming a "biometric token" which is transmitted along with the form to the IRS. (For white papers and other information on PenOp, see www.penop.com.) When the Service initially receives the electronic return, it does not open the biometric token or verify the signature information in it. Typically, it will never try specifically to verify the signature. (Similarly, few if any signatures on paper-and-ink documents filed with government agencies -- tax authorities, courts, county registries, etc. -- are verified upon receipt. Verification of ink signatures is not worth the effort. Sometime in the future, however, agencies such as IRS might try to use technologies like PenOp to verify electronic signatures upon receipt.)

The electronic signing with PenOp occurs within a controlled environment. The tax preparer is registered and regulated by the IRS, and subject to severe criminal and other penalties for abuse of the system. The preparer is identified on the 8453 form when it is submitted to the IRS, which occurs through a proprietary system open only to authorized tax preparers. When the signing process is complete, the preparer is required to hand the taxpayer a paper record of her return and 8453; and if the preparer neglects to offer the paper record, the taxpayer intuitively knows to ask for it because she needs something to keep with all her other tax records.

In the event of a later dispute -- in which the taxpayer takes the bold step of specifically repudiating her return -- it is most likely the IRS would prove the return's authenticity by reference, not so much to the signature, but rather to (1) the private information (such as employer withholding data) in the return, (2) the exchange of money (such as a payment or a refund) or other documents (such as correspondence with auditors) in relation to the return, or (3) records retained by the tax preparer or the taxpayer herself. Only in very rare disputes would the IRS have to rely greatly on the bitmap and biometric measurements buried in the PenOp biometric token.

What Does PenOp Contribute?

Given that the IRS does not rely heavily on the PenOp-captured signature to prevent repudiation, what purpose does it really serve? The answer is threefold.

FIRST, the IRS does check signatures on a fair number tax returns by simply asking taxpayers (such as at time of audit) whether the signatures on the returns are theirs. Of course taxpayers can deny their signatures if they choose, but normally they will not. (Reasons: normally the signatures are indeed theirs, normally taxpayers are honest, and normally taxpayers know that the origin of their returns can be proven from the combination of the signatures and the other facts and circumstances surrounding the returns.) This is an important, practical feature of the handwritten signature, and PenOp supports it. PenOp binds the 8453 form to a signature image, which when presented to the taxpayer later can help her verify the 8453 by visual inspection.

SECOND, the IRS needs to have the taxpayer do something that actively shows she believes the tax return is complete and she assents to it. Physical action by the taxpayer separates a draft document, which has no legal effect, from a final one, which is legally binding. The Service wants something that replaces the simplicity, intuitive meaning, modest reliability, and low cost of an autograph on paper.

This need for physical action might be satisfied by any number of methods, including PenOp, voiceprint capture, or the capture of a simple bitmap signature (United Parcel Service delivery people have been using the bitmap method for several years). The disadvantage of a bitmap by itself is that it is too easy for the tax preparer (e.g., H&R Block employee) to fabricate. A bitmap is just a simple scanned image of a graphic like an autograph. If the tax preparer has access to a bank check, a credit card receipt, or prior tax return signed by the taxpayer, it wouldn't be extremely difficult for him inconspicuously to create a false tax return. What is more, even if the tax preparer did not have a sample signature, he might be able to make a passable bitmap just by guessing what it would look like.

PenOp addresses this disadvantage. In addition to capturing a bitmap, PenOp captures statistics about the dynamic process of handwriting an autograph. The statistics are unique evidence linking the signer to the signing event roughly similar to the way an ink and paper signature does. The method PenOp uses to calculate and store those statistics is a complex secret hidden from the tax preparer. The secret can be changed from time to time by PenOp's developer and by the IRS, outside the knowledge of the preparer. PenOp therefore is a barrier to any tax preparer aiming to fabricate a return.

THIRD, PenOp deters a taxpayer from repudiating her tax return, and it does so in a way similar to the paper-and-ink signature. Suppose that a taxpayer signs an electronic 8453 form and receives from the tax preparer a paper record of it. Later, she deceitfully tries to repudiate the 8453. She claims that she did give her tax information to the preparer (and thus the 8453 form and the corresponding return report information known only to her), but that she never finally agreed to or signed the 8453 form in question. She claims she never received a paper record of the 8453 form, and the signature on the electronic 8453 held by the IRS was forged by the tax preparer.

An investigation could well reveal how her hollow claims are, if she signed with PenOp using her normal autograph. It would have required great effort for the tax preparer, or most anyone else, to forge her signature, for he does not know or have access to the biometric measurements of her signature (even if he does have a static copy or bitmap of the image of her signature). To have obtained the measurements by ruse would have been a considerable challenge.

What if the taxpayer had signed with PenOp, but had deliberately elected not to use her "normal" autograph? What if, instead of signing her autograph, she sketched a picture of a bird or a flower? Might she stand a better chance at repudiating her signing of the return? The answer might be yes. However, this risk of repudiation of a PenOp signature is equivalent to a risk that has always existed with paper tax returns. Taxpayers are free to use strange marks on their tax returns as their signatures. Paper and ink don't prevent this risk, and neither does PenOp. PenOp strives to offer the same risks and benefits as paper and ink.

Deterrence to Fraud

PenOp in and of itself does not prevent all the frauds a tax preparer might attempt with an electronic tax filing. PenOp by itself does not, for example, absolutely prevent the preparer from breaking into the application software that controls the 8453 form (software supplied by the IRS) and causing it to mislead PenOp as to which document is being signed or causing it to show on the computer monitor information that is different from what is being signed. However, these frauds are deterred, among other things, by two factors: (1) The taxpayer intuitively expects to receive a paper record of the return and the 8453. If the paper record does not match with what the tax preparer sends to the IRS, then the preparer (who is known and regulated by the IRS) risks being caught and punished. (2) Tinkering with the IRS's application software involves considerable work.

In assessing this deterrence, notice that the malicious tax preparer has little incentive to undertake much effort. The falsification of a PenOp signature would not win him a quick refund from the IRS. The IRS does not rely on signatures (whether ink/paper or PenOp) to guard at time of receipt against false requests for refunds. Signatures are merely *latent* controls that serve only in the event of relatively rare and expensive investigations of tax returns. Rather, to catch false refund requests the Service relies on *immediate* controls, such as independently verified information, such as tax withholding reports from the taxpayer's employer.

A Replacement for Ink

PenOp's mission is simple: it aims to compete with and replace its analog ancestor, the ink signature on paper. Like its ancestor, the PenOp signature intuitively informs the taxpayer that she is legally binding herself to her 8453 form. Subsequently, it helps her verify her return by visual inspection. And, like the properties of paper and ink, the biometric measurements in PenOp make it more difficult for the taxpayer who signed an 8453 later to repudiate it claiming the signature was forged by the tax preparer.