TREASURY INSPECTOR GENERAL FOR TAX ADMINISTRATION

The IRS Is Not Meeting Key Federal Requirements in Its Transition to Internet Protocol Version 6

September 23, 2024

Report Number: 2024-200-049

Why TIGTA Did This Audit

In November 2020, the Office of Management and Budget issued Memorandum M-21-07, *Completing the Transition to Internet Protocol Version 6 (IPv6)*, that communicates the requirements for completing the operational deployment of IPv6 across all Federal information systems and services.

In the last five years, IPv6 momentum in the industry has dramatically increased, with large IPv6 commercial deployments in many business sectors now driven by reducing cost, decreasing complexity, improving security, and eliminating barriers to innovation in networked information systems.

This audit was initiated to determine the IRS's effectiveness to convert its information systems and services to IPv6 to comply with the Office of Management and Budget requirements.

Impact on Tax Administration

In Fiscal Year 2023, the IRS collected approximately $4.7 trillion in Federal tax payments and processed 275 million tax returns and forms.

To support its operations to collect taxes, process tax returns, and enforce Federal tax laws, the IRS relies extensively on computerized systems. Further, successful modernization of IRS systems as well as the development and implementation of new technologies are necessary to meet evolving business needs and to enhance the taxpayer experience.

What TIGTA Found

The IRS did not complete key operational requirements for IPv6 deployment. Specifically, the IRS did not establish an agencywide IPv6 integrated project team within the required time frame and the team included only technical team members. In addition, the IRS did not make its agencywide IPv6 policy available on its publicly accessible website. The transition plan, updated in March 2023, did not include a key action to identify and provide a schedule for replacing and retiring systems that cannot be converted to use IPv6.

In addition, all IRS external facing servers and services as well as all IRS internal client applications that communicate with external facing internet servers and supporting enterprise networks are still not in direct support of IPv6-only communications. The IRS also did not ensure that 20 percent of internet protocol-enabled assets on the IRS network were operating in an IPv6-only environment within the time required by the Office of Management and Budget and Internal Revenue Manual guidance. Further, the IRS incorrectly reported that 21,424 assets needed to be transitioned to an IPv6 only environment.

Finally, IRS contracting officers did not consistently evaluate 8 (67 percent) of 12 information technology acquisitions for IPv6 compliance and three (60 percent) of five waivers for noncompliant assets were not renewed annually as required.

What TIGTA Recommended

TIGTA made a total of 11 recommendations. Seven of the recommendations were to the Chief Information Officer, including: create a primary project document to reflect current members of the IPv6 integrated project team; publish an IPv6 policy on the IRS website; ensure that servers and applications that communicate with public internet servers are updated to IPv6-only; and ensure that at least 50 percent of assets are operating in IPv6-only environments by the end of Fiscal Year 2024 as required. In addition, TIGTA made two recommendations to the Chief Technology Officer to update the transition plan to identify and provide a schedule for replacing or retiring systems that cannot be converted to use IPv6 and to review and sign the transition plan. TIGTA also made two recommendations to the Chief Procurement Officer to ensure that contracting officers include language that requires vendors to fully address IPv6 compliance.

The IRS agreed with eight recommendations and plans to publish an updated project charter; post the IPv6 policy memo to irs.gov; and update the transition plan to identify and provide a schedule for replacing or retiring systems that cannot be converted to use IPv6. The IRS disagreed with three recommendations stating it has implemented systems that are IPv4 and IPv6 capable in the interim; developed a schedule to update legacy systems to IPv6; and that contracting officers are not responsible for submitting information that shows whether an acquisition will use internet protocol. In response, TIGTA provided Office of Audit Comments in the report.

U.S. DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20024

TREASURY INSPECTOR GENERAL
FOR TAX ADMINISTRATION

September 23, 2024

MEMORANDUM FOR: COMMISSIONER OF INTERNAL REVENUE

FROM: Danny R. Verneuille
                   Acting Deputy Inspector General for Audit

SUBJECT: Final Audit Report – The IRS Is Not Meeting Key Federal Requirements
                   in Its Transition to Internet Protocol Version 6 (Audit No.: 2024200009)

This report presents the results of our review to determine the Internal Revenue Service's (IRS) effectiveness to convert its information systems and services to internet protocol version 6 (IPv6) to comply with the Office of Management and Budget requirements. This review is part of our Fiscal Year 2024 Annual Audit Plan and addresses the major management and performance challenge of *Protecting Taxpayer Data and IRS Resources*.

Management's complete response to the draft report is included as Appendix III. If you have any questions, please contact me or Jena Whitley, Acting Assistant Inspector General for Audit (Security and Information Technology Services).
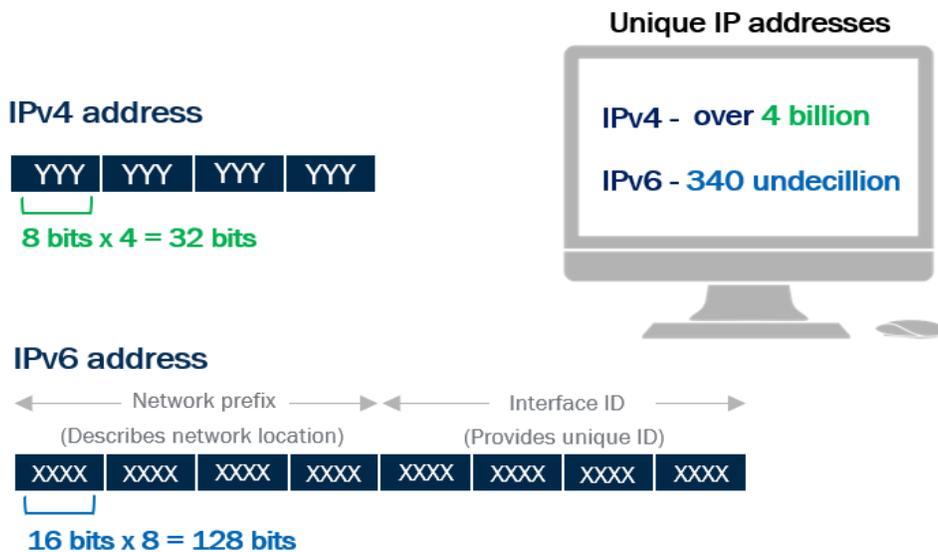
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Background

In Fiscal Year (FY) 2023, the Internal Revenue Service (IRS) collected approximately $4.7 trillion in Federal tax payments and processed 275 million tax returns and forms. In addition, Federal tax refund and outlay activities by the IRS totaled approximately $659 billion.[1] To support its operations to collect taxes, process tax returns, and enforce Federal tax laws, the IRS relies extensively on computerized systems. The successful modernization of IRS systems as well as the development and implementation of new technologies are necessary to meet evolving business needs and to enhance the taxpayer experience.

Every device that connects to a network is identified through an internet protocol address for internet communication. Internet protocol version 4 (IPv4) has over four billion public addresses; however, the huge increase in internet users and devices worldwide means that IPv4 addresses are running out. Internet protocol version 6 (IPv6), the next generation protocol, provides approximately 340 undecillion addresses, ensuring availability of new addresses far into the future as well as promoting the continued expansion and innovation of internet technology.[2] Figure 1 illustrates the increased network address size of 128 bits from IPv6 versus 32 bits from IPv4.

Figure 1: Comparison of IPv4 and IPv6 Addressing Scheme

Source: Treasury Inspector General for Tax Administration (TIGTA) report.[3]

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[1] Federal tax refund and outlay activities include refunds of tax overpayments, payments for interest, and disbursements for refundable tax credits, such as the Earned Income Tax Credit.

[2] See Appendix IV for a glossary of terms.

[3] TIGTA, Report No. 2014-20-016, *Planning Is Underway for the Enterprise-Wide Transition to Internet Protocol Version 6, but Further Actions Are Needed* (Feb. 2014).

Although IPv6 was developed in 1998, it has gained popularity in recent years to address the shortage of address assignments available under IPv4. In the last five years, IPv6 momentum in industry has dramatically increased, with large IPv6 commercial deployments in many business sectors now driven by reducing cost, decreasing complexity, improving security, and eliminating barriers to innovation in networked information systems. Several large network operators, software vendors, service providers, enterprises, State Governments, and foreign governments have deployed significant IPv6 infrastructures.

To leverage this larger address space, the Office of Management and Budget (OMB) sought to accelerate the transition to IPv6 in the Federal Government by issuing guidance in August 2005 that proposed a timeline for agency infrastructure to use IPv6 and agency networks to interface with this modernized IPv6 infrastructure by 2008.[4] The OMB advised agencies to ensure that all new information technology procurements be IPv6-compatible to capitalize on cost savings. In September 2010, the OMB released updated guidance that listed the necessary steps for agencies to expedite operational deployments of IPv6 to enable information technology modernization.[5] In November 2020, the OMB issued additional guidance which required agencies to complete the operational deployment of IPv6 across all Federal information systems and services, and helped agencies overcome barriers that impede them from migrating to an IPv6-only network environment.[6]

Results of Review

The IRS Did Not Complete Key Operational Requirements for Internet Protocol Version 6 Deployment

According to the OMB, the technical, economic, and security benefits of operating a single, modern, and scalable network infrastructure are the driving forces for the evolution towards IPv6-only in the private sector. To keep pace with and leverage this evolution in networking technology, the IRS is required to: 1) designate an agencywide IPv6 integrated project team, 2) issue an agencywide IPv6 policy, 3) complete a pilot of an IPv6-only operational system, 4) develop an IPv6 implementation plan, and 5) update the information resources management plan that the IRS agreed to develop and distribute in February 2014.

The IPv6 integrated project team included only technical team members

The IRS did not establish an agencywide IPv6 integrated project team within the time frame required by the OMB. In addition, we determined that the current integrated project team is comprised of technical team members with no representatives from the Acquisition and Policy functions.

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[4] OMB Memorandum, M-05-22, *Transition Planning for Internet Protocol Version 6 (IPv6)* (Aug. 2005).

[5] OMB Memorandum, *Transition to IPv6* (Sept. 2010).

[6] OMB Memorandum, M-21-07, *Completing the Transition to Internet Protocol Version 6 (IPv6)* (Nov. 2020). This most recent OMB Memorandum partially rescinded the requirements from the 2010 guidance but directs agencies to further enhance security by completing the transition to IPv6-enabled systems and services through a series of outlined milestones.

The OMB and the Internal Revenue Manual (IRM) require the IRS to designate an agencywide IPv6 integrated project team within 45 days of the date of issuance of the OMB memorandum.[7] The goal of the integrated project team is to effectively govern and enforce IPv6 efforts. The OMB requires Federal agencies to include in the IPv6 integrated project team technical members as well as representatives from the acquisition and policy functions. Further, the IRS IPv6 transition plan (hereafter called the transition plan) stated the IRS should create a cross-functional team to support IPv6 transition planning and implementation.

When we asked IRS personnel why they did not include the other functions in their integrated project team, they responded that the integrated project team focuses on the technical migration aspects of IPv6. Without agencywide representation, the integrated project team may lack some areas of expertise needed to collaboratively identify problems and propose and develop solutions during the transition.

Recommendation 1: The Chief Information Officer (CIO) should create a primary project document to reflect current members of the IPv6 integrated project team and ensure that the team is comprised of representatives from acquisition and policy functions as required by the OMB and IRM guidance.

> **Management's Response:** The IRS agreed with this recommendation. The IRS plans to publish an updated project charter listing current members of the IPv6 integrated project team consisting of representatives as required by the OMB and IRM guidance.

The IRS did not timely develop an IPv6 policy

The IRS did not timely develop an agencywide IPv6 policy as required by the OMB and the IRM.[8] The policy developed in September 2023 was not made available on the IRS's publicly accessible website. According to the OMB and the IRM, the IRS is required to issue an agencywide IPv6 policy within 180 days from November 19, 2020, and make the policy available on the agency's publicly accessible website. The policy should require that all new networked Federal information systems be IPv6-enabled at the time of deployment and state the agency's strategic intent to phase out the use of IPv4 for all systems no later than FY 2023.

When we asked the IRS for their publicly accessible IPv6 policy, IRS personnel responded that they did not think the requirement was applicable because the IRS is not a Department-level agency but is instead a bureau within the Department of the Treasury (hereafter referred to as Treasury). The IRS also stated that they had concerns about making the policy publicly available due to the sensitive nature of the information contained in the policy. When policies and procedures are not easily accessible, the IPv6 transition may face various challenges including lack of structure and inconsistent decision making. In addition, the IRS cannot be held publicly accountable for the transition to IPv6, if a policy is not made publicly available.

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[7] IRM 10.8.1, *Information Technology Security, Policy, and Guidance* (Dec. 2023).

[8] IRS, Memorandum, *Updated Procedures for Requesting IPv6 Waivers* (Sept. 2023).

Recommendation 2: The CIO should publish the agencywide IPv6 policy on the IRS's publicly accessible website.

> **Management's Response:** The IRS agreed with this recommendation. The IRS implemented the IPv6 policy in September 2022 and the policy was updated in September 2023. The IRS plans to post the policy memo to irs.gov.

The IRS did not timely complete an IPv6-only pilot

The IRS did not complete at least one pilot of an IPv6-only operational system within the required time frame. According to the OMB, Federal agencies were required to identify opportunities for IPv6-only pilots and complete at least one pilot of an IPv6-only operational system by the end of FY 2021. In November 2023, we asked the IRS to provide evidence of completion of a pilot of an IPv6-only operational system. The current IRS IPv6 team stated they could not find any documentation of a pilot but agreed to conduct a pilot during our audit. Without timely completion of a pilot and accurate capture and application of lessons learned, IRS systems that are transitioning to IPv6-only may run into communications issues resulting in wasted time and resources.

Management Action: In December 2023, the IRS provided evidence of the successful completion of a pilot of an IPv6-only operational system. The evidence provided showed successful communication between an IPv6-only workstation and the Business Object Enterprise application. The IRS also provided evidence of lessons learned which included the steps taken to transition the Business Object Enterprise application to an IPv6-only operational system.

The IRS did not timely complete an IPv6 implementation plan

The IRS did not timely complete its IPv6 implementation plan as required by the OMB and the IRM.[9] The IRS stated their transition plan is also their implementation plan. The transition plan, updated in March 2023, did not include a key action to identify and provide a schedule for replacing and retiring systems that cannot be converted to use IPv6. However, in April 2023, the IRS created a document in addition to the transition plan that provides a schedule for tracking asset transition to IPv6. Further, we found that the transition plan was not approved by the Chief Technology Officer as required.

According to the OMB and the IRM, one of the key actions that should have been in the plan is to identify and justify Federal information systems that cannot be converted to use IPv6 and provide a schedule for replacing or retiring these systems. Finally, the transition plan states that the IRS Chief Technology Officer is responsible for approving the transition plan and subsequent major updates.

The IRS stated it prioritized meeting its internal short-term goals of ensuring that 85 percent of IRS internet protocol assets are dual-stacked, capable of using IPv4 or IPv6, by December 2023, rather than timely completing its transition plan. In addition, the IRS incorrectly allowed the Director of Engineering Services, within the User and Network Services function, to approve the transition plan. Without a complete implementation plan, the IRS could experience project delays and budget constraints.

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[9] IRS, *IPv6 Transition Program, 2023 Transition Plan for IRS User and Network Services, Ver.1.1* (Mar. 2023).

The Chief Technology Officer, should:

Recommendation 3: Update the transition plan to identify and provide a schedule for replacing or retiring systems that cannot be converted to use IPv6.

> **Management's Response:** The IRS agreed with this recommendation. The IRS plans to update the transition plan to identify and provide a schedule for replacing or retiring systems that cannot be converted to use IPv6.

Recommendation 4: Review and sign the transition plan.

> **Management's Response:** The IRS agreed with this recommendation. The IRS plans to review and sign the IRS IPv6 implementation plan.

The IRS does not have an information resource management strategic plan

The IRS did not develop an information resource management strategic plan (hereafter referred to as the strategic plan) as required by the OMB. In July 2016, the OMB revised requirements for agencies to develop a strategic plan that describes the agency's technology and information resources goals.[10] Also, the OMB required agencies to update their strategic plan to state that all networked Federal systems and internet protocol-enabled assets associated with these systems would be updated to fully enable IPv6-only operation.

In February 2014, the IRS agreed with our recommendation to develop and distribute a strategic plan.[11] However, the IRS could not provide evidence that it developed a strategic plan in response to this recommendation. We also could not independently obtain the information provided to support the closure of the recommendation because the Joint Audit Management Enterprise System does not keep records over 10 years.

Without a strategic plan, the IRS would be unable to ensure that information resource management decisions are integrated with organizational planning, procurement, and program decisions.

Recommendation 5: The CIO should develop and distribute a strategic plan that incorporates the requirement to update all networked systems and assets associated with these systems to fully enable IPv6-only operation.

> **Management's Response:** The IRS agreed with this recommendation. The IRS developed an Information Technology Security Management Plan (Information Resources Management Strategic Plan) in December 2019 and will distribute the plan.

> > **Office of Audit Comment:** Despite numerous requests for this documentation, the IRS did not provide evidence of a strategic plan during the audit. Without a review of the plan that the IRS stated it developed in December 2019, we cannot determine if it meets the OMB requirements. In addition, distributing an outdated plan from December 2019 would not meet the intent of our recommendation because it would not address recent OMB guidance.

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[10] OMB, Revision of OMB Circular No-A-130, *Managing Information as a Strategic Resource* (Jul. 2016).

[11] TIGTA, Report No. 2014-20-016, *Planning Is Underway for the Enterprise-Wide Transition to Internet Protocol Version 6, but Further Actions Are Needed* (Feb. 2014).

IRS Environments Are Dual Stacked

External facing servers and internal client applications

The IRS external facing servers and services are not operationally using IPv6-only for communications. We reviewed a list of 14 external facing servers and services and their IPv6 transition status and determined that 13 (93 percent) are dual stacked and one (7 percent) is communicating using IPv4-only protocol. The IRS stated the server with IPv4-only communication will be dual stacked again after some IPv6 communication challenges are resolved.

We found that all 25 internal client applications in the current production environment that communicate with public internet servers and supporting enterprise networks are not operationally using IPv6-only for communication.

In September 2010, the OMB issued guidance which required agencies to upgrade external facing servers and internal client applications to operationally use IPv6-only by the end of FY 2012 and FY 2014, respectively. While these deadlines have passed, the OMB states that agencies who have not yet completed these actions need to do so as soon as possible. According to the OMB, these actions are still relevant, and agencies are required to address them in future IPv6 transition plans and reports.

Officials from the Cybersecurity function stated that the servers require continued support of IPv4 because there are multiple external partners and vendors that are still running IPv4-only network communication. They added that removing IPv4 would disrupt communication with customers and vendors. The IRS plans to update external facing servers and services to IPv6-only by the end of FY 2024 according to the transition plan.

In addition, the IRS stated the internal client applications are operating in an IPv4-only environment because they need the underlying infrastructure to support IPv6. It further noted that the plan to support IPv6 traffic flow will be carried out in sequential order starting with network, server, and platform environments and ending with applications. The IRS plans to upgrade internal client applications to operationally use IPv6-only communication by the end of FY 2025 according to the transition plan.

Dual stacked networks may lead to increased complexity as both IPv6 and IPv4 infrastructure must be maintained to continue communication throughout the network. Increased complexity can lead to misconfigured devices, which could introduce vulnerabilities, making the network more prone to compromise.

Recommendation 6: The CIO should ensure that external facing servers and internal client applications that communicate with public internet servers are updated to IPv6-only to meet OMB requirements.

> **Management's Response:** The IRS disagreed with this recommendation. Legacy applications that communicate directly with taxpayers will not be able to migrate to IPv6 only. This would potentially cut services to their external/public customers that are not IPv6 capable. Its external facing applications must continue to support IPv4 to support the mission of providing service to the public. The IRS stated it has implemented

The IRS Is Not Meeting Key Federal Requirements in Its Transition to Internet Protocol Version 6

systems that are IPv4 and IPv6 capable in the interim and it is developing a long-term strategy to replace these systems.

> **Office of Audit Comment:** The OMB states that the approach of using both IPv4 and IPv6 is overly complex to maintain and unnecessary. Operating a dual stacked network for a prolonged period increases both the operational burden and the attack surface.

Transitioning assets

The IRS did not transition 20 percent of its assets requiring an internet protocol address to an IPv6-only environment within the time required by the OMB and IRM guidance. We found that 28 (less than 1 percent) of over 200,000 internet protocol-enabled assets were operating in an IPv6-only environment at the end FY 2023. Further, we found that 18 (64 percent) of these 28 IPv6-only assets were taken offline due to communication issues while the remaining 10 were in a development or test environment.

The OMB requires Federal agencies to have at least 20 percent of assets on Federal networks operating in IPv6-only environments by the end of FY 2023. An official from the User and Network Services function stated that the IRS cannot transition to IPv6 until all devices on the network and all external connections are able to communicate using IPv6. Without timely transitioning to IPv6-only communication, IRS systems will be vulnerable targets for common attacks prevalent in IPv4 networks such as distributed denial of service, port scanning, and spoofing.

Recommendation 7: The CIO should ensure that the IRS has at least 50 percent of internet protocol-enabled assets on its network operating in IPv6-only environments by the end of FY 2024 as required by the OMB.

> **Management's Response:** The IRS disagreed with this recommendation. The IRS developed a schedule to update legacy systems to IPv6 by September 2026 and is pending further Treasury guidance for IPv6 transition.
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> > **Office of Audit Comment:** The OMB requirement is not only directed at legacy systems but for internet protocol-enabled assets. During the audit, the IRS provided no evidence of its September 2026 schedule and no evidence of Treasury guidance that would exempt or extend the transition timeline set by the OMB. The IRS therefore has a duty to meet this mandate. In addition, the IRS stated in their transition plan that it would have at least 50 percent of internet protocol enabled assets operating in IPv6 only by the end of FY 2024 and is now not intending to meet its own performance target.

The IRS's Inventory of Internet Protocol-Enabled Assets Is Inaccurate

The IRS provides metrics to internal management to monitor its progress towards the transition of assets to IPv6. We worked with various business functions to determine the number of assets that needed to be transitioned and compared that with the number of assets reported in the March 2024 IPv6 CIO metrics and found that the IRS overstated the number of assets that needed to transition to IPv6. We counted 165,251 actual assets that needed to be transitioned

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to IPv6. The IRS inaccurately reported a total asset count of 186,675 in the March 2024 IPv6 CIO metrics. Therefore, the IRS incorrectly reported that 21,424 (186,675–165,251) of these assets needed to transition to an IPv6-only environment. Figure 2 shows the number of assets reported by each IRS function in the March 2024 IPv6 CIO metrics and our actual count of assets by date.

Figure 2: Analysis of Internet Protocol-Enabled Assets Compared to Metrics Reported in March 2024

Date IRS Provided Assets List	TIGTA's Assessment of IRS Assets List	Number of Assets Reported on IPv6 CIO Metrics for March 2024	IRS Function
March 4, 2024	477	0	Applications Development
March 5, 2024	1,480	1,162	Cybersecurity
March 6, 2024	24	24	Appeals
March 6, 2024	14	14	Wage and Investment
March 8, 2024	681	434	Research, Applied Analytics and Statistics
March 8, 2024	6,677	3,592	Criminal Investigations
March 8, 2024	308	348	Enterprise Services
March 14, 2024	147,402	168,475	User and Network Services
April 9, 2024	8,188	12,626	Enterprise Operations
Totals	165,251	186,675	

Source: TIGTA's analysis of reported metrics and IRS inventories.

Federal guidance required agencies to perform automated asset discovery every seven days and at minimum this discovery must cover the entire IPv4 space used by the agency by April 3, 2023.[12] In addition, the National Institute of Standards and Technology requires Federal agencies to maintain the currency, completeness, accuracy, and availability of the inventory of system components using an automated system.[13] Further, the IRM states that the IRS should develop and document an inventory of information system components that accurately reflects the current information system.

The discrepancy in the assets counts occurred because the IPv6 integrated project team did not validate the total number of assets reported by IRS functions which are using different inventories. In addition, the IRS was not using an automated process to collect the metrics.

An inaccurate inventory can hinder the agency's ability to accurately identify assets that need to be transitioned to IPv6. It can also negatively affect systems that rely on the information within the official inventory, such as configuration and vulnerability scanning tool inventories. In

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[12] Cybersecurity Infrastructure Security Agency, Binding Operational Directive 23-01, *Improving Asset Visibility and Vulnerability Detection on Federal Networks* (Oct. 2022).

[13] National Institute of Standards and Technology, SP 800-53 Rev 5., *Security and Privacy Controls for Information Systems and Organizations* (Sept. 2020).

addition, without having a central database to track assets, the IRS will be unable to see what assets need to be removed from the network, discarded, or updated. This can increase the attack surface for bad actors as outdated systems can lead to exploited vulnerabilities.

Recommendation 8: The CIO should use an automated process to identify and document in the official IRS asset management system a comprehensive inventory of all assets at the IRS.

> **Management's Response:** The IRS agreed with this recommendation. The IRS plans to develop a system that will manage the multiple systems that house the inventory of internet protocol-enabled systems into a single data source.

Oversight of Asset Acquisitions and Waivers Is Insufficient

Evaluating acquisitions for IPv6 compliance

We could not determine if the IRS consistently evaluated information technology acquisitions to determine if internet protocol would be used for network communication. We found that IRS contracting officers either did not accurately complete or submit documentation to show if internet protocol would be used for communication for 8 (67 percent) of 12 acquisitions sampled.[14] However, the four (33 percent) remaining acquisitions were properly completed and submitted, or internet protocol was not applicable. We also found that the IRS did not ensure that IPv6 compliance is fully addressed with IPv6 language in requirement documents for the eight acquisitions. For example, for one of the acquisitions we evaluated, the IRS responded that the product appeared to be internet protocol related but there was no evidence the acquisition was evaluated to determine if it requires internet protocol for communication. In another instance, the IRS incorrectly submitted documentation stating the acquisition does not require internet protocol for communication.

According to the OMB, when purchasing networked information technology and services, agencies should include the requirement for hardware and software to be capable of operating in an IPv6-only environment. In addition, Treasury acquisition guidelines state that requiring activities are responsible for ensuring that IPv6 requirements are fully addressed with IPv6 language in requirement documents.[15] Further, the IRS IPv6 policy requires it to limit the acquisition of noncompliant or incompatible IPv6 hardware and software to align the IRS to documented IPv6 requirements.

This happened because IRS contracting officers did not complete and submit documentation to determine if the acquisition will use internet protocol for communication. Without evaluating acquisitions for IPv6 compliance, the IRS may buy products that may eventually be unable to communicate with the network.

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[14] A judgmental sample is a nonprobability sample, the results of which cannot be used to project to the population. The sample included acquisitions for printers, scanners, network switches, intrusion detection systems and video surveillance systems.

[15] Treasury, *Acquisition Procedures*, Ver. 1.7.1 (Aug. 2022). Requirements documents include statement of work and performance work statements; and, if applicable, source selection plan and technical evaluation factors.

The Chief Procurement Officer, should:

Recommendation 9: Ensure that contracting officers consistently and accurately complete and submit documentation that shows whether an acquisition will use internet protocol.

> **Management's Response:** The IRS disagreed with this recommendation. The Procurement Office implemented an updated acquisition package document checklist in June 2024, to ensure that program offices submit complete and accurate requests for inclusion of internet protocol in new contracts. The Procurement Office and Contracting Officers specifically are not responsible for submission of this information. The IRS program offices are responsible, utilizing the referenced checklist, to identify specific acquisitions requiring use of internet protocol.

> > **Office of Audit Comment:** We found checklist documentation incorrectly submitted and missing IPv6 required elements. In addition, we found that the individuals responsible for completing and submitting the IPv6 documentation are within the Procurement Office. Therefore, the Chief Procurement Officer should ensure that the requirements in the checklist are enforced and completed sufficiently.

Recommendation 10: Ensure that contracting officers include language that requires vendors to fully address IPv6 compliance in requirement documents for acquisitions that will use internet protocol.

> **Management's Response:** The IRS agreed with this recommendation. The Procurement Office plans to continue to utilize the acquisition package document checklist to ensure that contracts include required language to address IPv6 compliance if applicable.

> > **Office of Audit Comments:** While the IRS agreed with our recommendation, its response to continue utilizing the acquisition package document checklist would not address the intent of our recommendation. We found contracting officers did not follow the requirements to include IPv6 compliance language in requirement documents even when the checklist required it.

Reviewing waivers for noncompliant assets

We found that the IRS did not timely review five waivers for assets that were not compliant with IPv6 requirements. Three (60 percent) of the five waivers expired in 2023 and the other two (40 percent) expired in the first quarter of Calendar Year 2024. The IRS stated it is in the process of renewing the two waivers that recently expired and pending receipt of updated waivers. According to the OMB, an agency CIO can waive the IPv6 requirement for information technology acquisitions that use internet protocol. According to the IRS IPv6 policy, noncompliant or incompatible systems that are in use must have a waiver on file and a roadmap to become compliant by FY 2025, and that all waivers will be renewed annually.

The IRS stated this happened because there have been several leadership changes at the IRS in the last six months which caused significant delays in the waiver review process. Without timely reviewing the expired waivers, management may be unaware of the assets that are still not IPv6 compliant and if the IRS were to switch to an IPv6-only environment, these assets may not be able to communicate.

Management Action: In June 2024, the IRS provided evidence showing that one of the expired waivers has been renewed.

Recommendation 11: The CIO should ensure that waivers for assets that are not IPv6 compliant are renewed at least annually, as required.

> **Management's Response:** The IRS agreed with this recommendation. The IRS plans to ensure that waivers for assets that are not IPv6 compliant are renewed at least annually, as required.

Detailed Objective, Scope, and Methodology

The overall objective was to determine the IRS's effectiveness to convert its information systems and services to IPv6 to comply with the OMB requirements. To accomplish our objective, we:

- Determined whether the IRS timely completed key operational requirements for IPv6 deployment by evaluating the OMB requirements, researching the IRS's website and documentation, interviewing IRS personnel regarding agencywide IPv6 policy and implementation plan, and reviewing documentation for the completion of an IPv6-only pilot.

- Determined whether external facing servers and internal client applications that communicate with public servers have been updated to operationally use IPv6-only by reviewing the inventory list of these systems and the associated IPv4 and IPv6 addresses.

- Determined if the IRS is meeting the OMB Federal mandate to ensure that at least 20 percent of IRS assets were operating in an IPv6-only environment by the end of FY 2023 by obtaining and reviewing the IPv6 addresses associated with the assets transitioned to IPv6-only.

- Determined whether the IRS is adhering to Federal IPv6 acquisition guidelines by interviewing IRS personnel to determine the policies and procedures related to acquisition requirements and by reviewing requirements documents for the acquisitions. For noncompliant acquisitions, we reviewed waivers submitted to document the noncompliance to determine if waivers are reviewed annually. We judgmentally selected a sample of 12 acquisitions from a population of 7,299 listed in the Limited Access Data repository from FY 2021 to FY 2023.[1] We selected a judgmental sample because we wanted to focus on acquisitions by other IRS business units outside of the Information Technology organization. We limited our sample to 12 acquisitions based on available resources and we did not plan to project to the population.

Performance of This Review

This review was performed with information obtained from User and Network Services, Office of the Chief Procurement Officer, and IRS Information Technology organization personnel located at the New Carrollton Federal Building in Lanham, Maryland, and in Washington, D.C., during the period October 2023 through July 2024. We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

Major contributors to the report were Jena Whitley, Acting Assistant Inspector General for Audit (Security and Information Technology Services); Jason McKnight, Director; Daniel Preko, Audit

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[1] A judgmental sample is a nonprobability sample, the results of which cannot be used to project to the population.

Manager; Suzanne Westcott, Lead Auditor; Shanda Braxton, Auditor; and Justin Binu, Audit Intern.

Data Validation Methodology

During this review, we relied on IRS procurement data obtained from TIGTA's Limited Access Data repository. The data was pulled by TIGTA's Applied Research and Technology team. The Applied Research and Technology team performed a data reliability assessment. We evaluated the data by 1) reviewing the data to ensure that the appropriate type of information was entered into the corresponding field; 2) interviewing knowledgeable IRS procurement personnel about the data; and 3) reviewing IRS requirements documents based on the purchase order numbers identified in the data. We determined that the data were sufficiently reliable for the purposes of this report.

Internal Controls Methodology

Internal controls relate to management's plans, methods, and procedures used to meet their mission, goals, and objectives. Internal controls include the processes and procedures for planning, organizing, directing, and controlling program operations. They include the systems for measuring, reporting, and monitoring program performance. We determined that the following internal controls were relevant to our audit objective: Federal and IRS policies and procedures related to the transition to IPv6; and the Treasury Acquisition Procedures. We evaluated these controls by reviewing documentation related to the status of the IRS IPv6 transition and a sample of acquisition contract files.

Appendix II

Outcome Measure

This appendix presents detailed information on the measurable impact that our recommended corrective action will have on tax administration. This benefit will be incorporated into our Semiannual Report to Congress.

Type and Value of Outcome Measure:

- Reliability of Information – Potential; 21,424 internet protocol assets incorrectly reported on the March 2024 IPv6 CIO metrics (see Recommendation 8).

Methodology Used to Measure the Reported Benefit:

The total number of assets the IRS reported on the March 2024 IPv6 CIO metrics was inaccurate. The IRM requires the IRS to develop and document an inventory of information system components that accurately reflects the current information system.

The IRS reported a total of 186,675 internet protocol assets on the March 2024 IPv6 CIO metrics that needed to be transitioned to IPv6. Our count of actual assets requiring transition totaled 165,251. Therefore, the IRS incorrectly reported that 21,424 (186,675-165,251) assets needed to transition to IPv6.

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Appendix III

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Management's Response to the Draft Report

DEPARTMENT OF THE TREASURY
INTERNAL REVENUE SERVICE
WASHINGTON, DC 20224

CHIEF INFORMATION OFFICER

September 9, 2024

MEMORANDUM FOR ACTING DEPUTY INSPECTOR GENERAL FOR AUDIT

FROM: Rajiv Uppal,   *Kaschit D. Pandya* Digitally signed by Kaschit D. Pandya Date: 2024.09.06 09:39:48 -04'00'   For Rajiv Uppal
                   Chief Information Officer

SUBJECT: Draft Audit Report – The IRS Is Not Meeting Key Federal
                   Requirements in Its Transition to Internet Protocol Version 6
                   (Audit #2024200009)

Thank you for the opportunity to review and comment on the draft audit report and
address your observations with the audit team. The IRS remains committed to migrating
to an Internet Protocol version 6 (IPv6)-only environment in a manner that does not
significantly interrupt services or block those attempting to visit the IRS.gov website.

The IRS must implement operational directives in the context of our current technology
environment. Currently, we have multiple external partners and vendors that are still
running Internet Protocol version 4 (IPv4)-only network communication. In addition,
approximately 75% of all web traffic to IRS.gov is generated from an IPv4 address. The
IRS plans to update external-facing servers and services to IPv6-only when technically
feasible without impacting our ability to service customers and update internal client
applications to operationally use IPv6-only by the end of fiscal year 2026. We agree
with most of the auditor's recommendations and have nearly completed many of the
corrective actions to further improve oversight and management controls, including the
associated outcome measure. Please refer to the attached planned corrective actions
for specific details.

The IRS values the continued support and partnership provided by your office. If you
have any questions, please contact me at (202) 317-5000, or a member of your staff
may contact Lou Capece, Director of Network Engineering, at (484) 636-0479.

Attachment

<div align="right">Attachment</div>

Audit# 2024200009, *The IRS has not meet some of the Federal Requirements in Its Transition to Internet Protocol Version Six.*

Recommendations

RECOMMENDATION 1: The Chief Technology Officer (CTO) should create a primary project document to reflect current members of the IPv6 integrated project team and ensure that the team is comprised of representatives from Acquisition and Policy functions as required by the OMB and IRM guidance.

CORRECTIVE ACTION 1: The IRS agrees with this recommendation. We will publish an updated project charter listing current members of the IPv6 integrated project team consisting of representatives as required by the OMB and IRM guidance.

IMPLEMENTATION DATE: October 15, 2024

RESPONSIBLE OFFICIAL(S): Associate Chief Information Officer, Enterprise Operations

RECOMMENDATION 2: The Chief Information Officer (CIO) should develop an IPv6 policy stating the agency's strategic intent to phase out the use of IPv4 and publish it on its publicly accessible website.

CORRECTIVE ACTION 2: The IRS agrees with this recommendation. We implemented the IPv6 policy in September 2022 and the policy was updated in September 2023. The policy memo will be posted to irs.gov.

IMPLEMENTATION DATE: October 15, 2024

RESPONSIBLE OFFICIAL(S): Associate Chief Information Officer, Enterprise Operations

RECOMMENDATION 3: The CTO should update the transition plan to identify and provide a schedule for replacing or retiring systems that cannot be converted to use IPv6.

CORRECTIVE ACTION 3: The IRS agrees with this recommendation. We will update the transition plan to identify and provide a schedule for replacing or retiring systems that cannot be converted to use IPv6.

IMPLEMENTATION DATE: October 15, 2024

RESPONSIBLE OFFICIAL(S): Associate Chief Information Officer, Enterprise Operations

<div align="center">1</div>

Audit# 2024200009, *The IRS has not meet some of the Federal Requirements in Its Transition to Internet Protocol Version Six.*

RECOMMENDATION 4: The CTO should review and sign the IRS IPv6 implementation plan.

CORRECTIVE ACTION 4: The IRS agrees with this recommendation. We will review and sign the IRS IPv6 implementation plan.

IMPLEMENTATION DATE: October 15, 2024

RESPONSIBLE OFFICIAL(S): Associate Chief Information Officer, Enterprise Operations

RECOMMENDATION 5: The CIO should develop and distribute an information resources management strategic plan that incorporates the requirement to update all networked Federal systems and assets associated with these systems to fully enable IPv6-only operation.

CORRECTIVE ACTION 5: The IRS agrees with this recommendation. We have developed an IT Security Management Plan (Information Resources Management Strategic Plan) in December 2019 and will distribute the plan.

IMPLEMENTATION DATE: October 15, 2024

RESPONSIBLE OFFICIAL(S): Associate Chief Information Officer, Enterprise Operations

RECOMMENDATION 6: The CIO should ensure that external facing servers and internal client applications are updated to IPv6-only to meet the OMB requirements.

CORRECTIVE ACTION 6: The IRS disagrees with this recommendation. Legacy applications that communicate directly with taxpayers will not be able to migrate to IPv6 only. This would potentially cut services to our external/public customers that are not IPv6 capable. Our external facing applications must continue to support IPv4 to support the mission of providing service to the public. We have implemented systems that are IPv4 and IPv6 capable in the interim and is developing a long-term strategy to replace these systems.

IMPLEMENTATION DATE: N/A

RESPONSIBLE OFFICIAL(S): N/A

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<div align="right">Attachment</div>

Audit# 2024200009, *The IRS has not meet some of the Federal Requirements in Its Transition to Internet Protocol Version Six.*

RECOMMENDATION 7: The CIO should ensure that the IRS has at least 50 percent of internet protocol-enabled assets on its network operating in IPv6-only environments by the end of FY 2024.

CORRECTIVE ACTION 7: The IRS disagrees with this recommendation. We have developed a schedule to update legacy systems to IPv6 by September 2026 and is pending further Treasury guidance for IPv6 transition.

IMPLEMENTATION DATE: N/A

RESPONSIBLE OFFICIAL(S): N/A

RECOMMENDATION 8: The CIO should use an automated process to identify and document in the official IRS asset management system a comprehensive inventory of all assets at the IRS.

CORRECTIVE ACTION 8: The IRS agrees with this recommendation. We will develop a system that will manage the multiple systems that house the inventory of IP-enabled systems into a single data source.

IMPLEMENTATION DATE: February 15, 2025

RESPONSIBLE OFFICIAL(S): Associate Chief Information Officer, Enterprise Operations

RECOMMENDATION 9: The Chief Procurement Officer should ensure that contracting officers consistently and accurately complete and submit documentation that shows whether an acquisition will use internet protocol.

CORRECTIVE ACTION 9: The IRS disagrees with this recommendation. The Procurement Office implemented an updated acquisition package document checklist in June 2024 to ensure IRS program offices submit complete and accurate requests for inclusion of internet protocol in new contracts. The Procurement Office and Contracting Officers specifically are not responsible for submission of this information. IRS program offices are responsible, utilizing the referenced checklist, to identify specific acquisitions requiring use of internet protocol.

IMPLEMENTATION DATE: N/A

RESPONSIBLE OFFICIAL(S): N/A

<div align="center">3</div>

Attachment

Audit# 2024200009, *The IRS has not meet some of the Federal Requirements in Its Transition to Internet Protocol Version Six.*

RECOMMENDATION 10: The Chief Procurement Officer should ensure that contracting officers include language that requires vendors to fully address IPv6 compliance in requirements documents for acquisitions that will use internet protocol.

CORRECTIVE ACTION 10: The IRS agrees with this recommendation. The Procurement Office will continue to utilize the acquisition package document checklist to ensure that contracts include required language to address IPv6 compliance if applicable.

IMPLEMENTATION DATE: Implemented

RESPONSIBLE OFFICIAL(S): Chief Procurement Officer

RECOMMENDATION 11: The CIO should ensure that waivers for assets that are not IPv6 compliant are renewed at least annually, as required.

CORRECTIVE ACTION 11: The IRS agrees with this recommendation. We will ensure that waivers for assets that are not IPv6 compliant are renewed at least annually, as required.

IMPLEMENTATION DATE: October 15, 2024

RESPONSIBLE OFFICIAL(S): Associate Chief Information Officer, Enterprise Operations

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Appendix IV

Glossary of Terms

Term	Definition
Acquisition	The acquiring, by contract with appropriated funds, of supplies or services (including construction) by and for the use of the Federal Government through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated, and evaluated.
Appeals Function	Since its establishment by the IRS in 1927, Appeals has been the administrative function within the IRS with authority to consider settlements of tax controversies and has the primary responsibility to resolve these disputes without litigation to the maximum extent possible through an administrative settlement of the matter.
Application	An information technology component of a system that utilizes information technology resources to store, process, retrieve, or transmit data or information using information technology hardware and software.
Applications Development Function	A function within the IRS Information Technology organization responsible for building, testing, delivering, and maintaining integrated information applications systems or software solutions, to support modernized systems and the production environment.
Business Objects Enterprise	A software product that provides a comprehensive set of tools for reporting and analyzing data, scheduling, and delivering documents, and managing project tasks.
Criminal Investigation Function	A function within the IRS Information Technology organization responsible for ensuring IRS compliance with Federal laws and regulations to assure the security of IRS systems, services, and data.
Cybersecurity Function	A function within the IRS Information Technology organization responsible for ensuring compliance with Federal statutory, legislative, and regulatory requirements governing confidentiality, integrity, and availability of IRS electronic systems, services, and data.
Distributed Denial of Service	A malicious attempt to disrupt the normal traffic of a targeted server, service, or network by overwhelming the target or its surrounding infrastructure with a flood of internet traffic.
Dual Stacked Network	The simultaneous implementation of both IPv4 and IPv6 protocols in a network configuration. This design allows devices to communicate using either address protocol, enhancing interoperability and facilitating a smooth transition from IPv4 to IPv6.
Enterprise Architecture	The description of an enterprise's entire set of systems: how they are configured, how they are integrated, how they interface to the external environment at the enterprise's boundary, how they are operated to support the enterprise mission, and how they contribute to the enterprise's overall security posture.

Term	Definition
Enterprise Operations Function	A function within the IRS Information Technology organization responsible for providing support for IRS mainframes and a vast environment of computer servers, which includes physical and virtual machines that enable services for all IRS business entities and taxpayers.
Enterprise Services Function	A function within the IRS Information Technology organization responsible for establishing IRS technology policies and the Enterprise Architecture, among other services.
Implementation Plan	A written document that outlines a team's steps to accomplish a goal or project. This document enables team members and key stakeholders to understand all aspects of a project before executing it.
Information Resource Management Strategic Plan	A plan that describes how long-term investment strategies are developed and how those strategies are tied to annual operations planning, budgeting, and reporting activities.
Information Technology	Any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by an executive agency. The term information technology includes computers, ancillary equipment, software, firmware and similar procedures, services (including support services), and related resources.
Infrastructure	The hardware, software, and network resources and services required for the existence, operation, and management of an enterprise information technology environment. It allows an organization to deliver information technology solutions and services to its employees, partners, and customers and is usually internal to an organization and deployed within owned facilities.
Integrated Project Team	A multi-disciplinary group of knowledgeable and experienced experts who are committed to a common purpose, performance objectives, and approach to delivering specified work products in a timely fashion and within budget.
Internet Protocol	Standard protocol for transmission of data from source to destinations in packet-switched communications networks and interconnected systems of such networks.
Internet Protocol Version 4	The version of the internet protocol which specifies a 32-bit address field which will run out of available address space in the near future.
Internet Protocol Version 6	The next generation internet protocol which allows a 128-bit address field in the form of eight 16-bit integers represented as four hexadecimal digits separated by colons.
Internet Protocol Version 6-enabled	A system or service in which the use of IPv6 is turned on for production use.
Internet Protocol Version 6-only	The state of an operational system or service when IPv4 protocol functions such as addressing, or packet forwarding are not in use.

Term	Definition
Inventory	A detailed list of assets.
Joint Audit Management Enterprise System	The Treasury's system for use by all bureaus to track, monitor, and report the status of internal control audit results. The system tracks specific information on issues, findings, recommendations, and planned corrective actions from audit reports issued by oversight agencies, such as TIGTA.
National Institute of Standards and Technology	An agency under the Department of Commerce that is responsible for developing standards and guidelines for providing adequate information security for all Federal Government agency operations and assets.
Office of Management and Budget	The agency that assists the President in overseeing the preparation of the Federal budget and to supervise administration in Executive Branch agencies. The OMB evaluates the effectiveness of agency programs, policies, and procedures. The OMB oversees and coordinates the Administration's procurement, financial management, information, and regulatory policies.
Platform	A computer or hardware device, operating system, or virtual environment on which software can be installed or run.
Policy	A set of rules that govern behavior of an organization and are important aspects of a company culture and are created to ensure that the organization is operating in a way that is consistent with its values and goals.
Port Scanning	A method of determining which ports on a network are open and could be receiving or sending data.
Requirement Documents	Documents that include statement of work and performance work statements and, if applicable, a source selection plan and technical evaluation factors.
Research, Applied, Analytics and Statistics Function	A function that is the IRS's centralized research and analytic organization. It is distinct from research operations embedded in the business units in that its projects are more likely to have enterprise or cross-organizational impact or reflect the needs and responsibilities of the entire IRS.
Spoofing	Packets which have a modified source address to either hide the identity of the sender, to impersonate another computer system, or both.
Undecillion	A cardinal number represented by one followed by 36 zeros.
User and Network Services Function	A function within the IRS Information Technology organization that supplies and maintains all desk-side (including telephone) technology, provides workstation software standardization and security management, inventories data-processing equipment, conducts annual certification of assets, provides the Information Technology Service Desk as the single point of contact for reporting an information technology issue, and equips the Volunteer Income Tax Assistance program.
Wage and Investment Division	The IRS business unit that serves taxpayers whose only income is derived from wages and investments.

Term	Definition
Waiver	A process utilized by IRS Enterprise Architecture organization. System Owners can request a waiver for system(s) that cannot meet the infrastructure configuration management requirements established by the Enterprise Architecture.

Appendix V

Abbreviations

CIO	Chief Information Officer
FY	Fiscal Year
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
IRM	Internal Revenue Manual
IRS	Internal Revenue Service
OMB	Office of Management and Budget
TIGTA	Treasury Inspector General for Tax Administration

**To report fraud, waste, or abuse,
contact our hotline on the web at www.tigta.gov or via e-mail at
oi.govreports@tigta.treas.gov.**

**To make suggestions to improve IRS policies, processes, or systems
affecting taxpayers, contact us at www.tigta.gov/form/suggestions.**