# **Case Study: Troubleshooting AWS WorkMail Email Delivery with Lightsail and Route 53**

## **Overview**

**Objective**: Configure gptpat.com to host a WordPress site on AWS Lightsail and enable email functionality via AWS WorkMail, ensuring both services coexist under a single domain.

**Challenge**: Emails were not being received despite configuring DNS records, due to conflicts between Lightsail DNS, Route 53, and WorkMail requirements.

**Outcome**: Successfully resolved DNS conflicts, verified WorkMail configuration, and enabled email delivery while maintaining WordPress functionality.

**Technologies Used**: AWS Lightsail, Route 53, WorkMail, SES, DNS management tools.

**Duration**: March 2025, spanning multiple troubleshooting iterations.

## **Background**

I set out to build a personal domain, gptpat.com, hosting a WordPress site on AWS Lightsail and using AWS WorkMail for email. The Lightsail instance (named patgpt1) was assigned a static IP (13.216.11.87) and IPv6 address (2600:1f18:223e:ff00:8a3:99c7:7103:1c91). WorkMail required specific DNS records (MX, CNAME, TXT) to receive emails, but initial attempts failed—emails sent to test@gptpat.com never arrived. This case study documents the troubleshooting process, highlighting the challenges, solutions, and lessons learned.

## **Problem Statement**

* **Symptoms**: Emails sent to gptpat.com addresses were not delivered, despite adding WorkMail DNS records.
* **Initial Setup**:
  + Lightsail hosted WordPress with A/AAAA records pointing to the instance.
  + Route 53 was the domain registrar and hosted a zone with WorkMail records.
  + WorkMail console showed records as "Missing" or "Inconsistent."
* **Root Cause**: A mismatch between Route 53 registrar nameservers and the hosted zone, compounded by Lightsail DNS conflicts.

## **Troubleshooting Journey**

### **Step 1: Initial Configuration Attempts**

* **Action**: Added WorkMail DNS records in a Route 53 hosted zone (Z05646691FN5FNMXNIIC2):
  + MX gptpat.com 10 inbound-smtp.us-east-1.amazonaws.com
  + CNAME autodiscover.gptpat.com autodiscover.mail.us-east-1.awsapps.com
  + TXT records for SPF, DMARC, and domain ownership.
* **Issue**: WorkMail didn’t recognize these records.
* **Discovery**: Route 53 registrar nameservers (ns-1060.awsdns-04.org, etc.) didn’t match the hosted zone nameservers (ns-318.awsdns-39.com, etc.).

### **Step 2: Identifying Lightsail Interference**

* **Action**: Checked Lightsail DNS zone for gptpat.com.
* **Findings**:
  + Lightsail managed A/AAAA records for WordPress but lacked WorkMail records.
  + Nameservers matched the registrar (ns-1060.awsdns-04.org), suggesting Lightsail’s zone was authoritative.
* **Hypothesis**: Lightsail DNS was overriding Route 53, causing mail servers to miss the MX record.

### **Step 3: Consolidating DNS in Lightsail**

* **Action**:
  + Added WorkMail records to Lightsail DNS:
    - MX 10 gptpat.com inbound-smtp.us-east-1.amazonaws.com
    - CNAME autodiscover.gptpat.com autodiscover.mail.us-east-1.awsapps.com
    - TXT records for SPF, DMARC, and DKIM.
  + Deleted the extra Route 53 hosted zone (Z05646691FN5FNMXNIIC2).
* **Result**: WorkMail verified MX, CNAME, and TXT records, but emails still didn’t arrive.

### **Step 4: Addressing SES and "MAIL FROM"**

* **Discovery**: SES showed "MAIL FROM" domain (www.gptpat.com) as "Pending" and DKIM as "Temporary failed."
* **Action**:
  + Added in Lightsail:
    - MX 10 www.gptpat.com feedback-smtp.us-east-1.amazonaws.com
    - TXT www.gptpat.com "v=spf1 include:amazonses.com ~all"
  + Resolved input errors by separating priority and target in Lightsail’s UI.
* **Result**: SES "MAIL FROM" verified, DKIM eventually verified after propagation.

### **Step 5: Final Fix—Mailbox Creation**

* **Issue**: Emails still not received despite verified DNS.
* **Discovery**: No mailbox existed in WorkMail.
* **Action**:
  + Created a user (test@gptpat.com) in WorkMail.
  + Sent a test email from an external account.
* **Result**: Email successfully delivered to test@gptpat.com.

## **Final Configuration**

* **Lightsail DNS**:
  + A gptpat.com 13.216.11.87
  + AAAA gptpat.com 2600:1f18:223e:ff00:8a3:99c7:7103:1c91
  + MX 10 gptpat.com inbound-smtp.us-east-1.amazonaws.com
  + MX 10 www.gptpat.com feedback-smtp.us-east-1.amazonaws.com
  + CNAME autodiscover.gptpat.com autodiscover.mail.us-east-1.awsapps.com
  + TXT records for SPF, DMARC, domain ownership, and DKIM CNAMEs.
* **WorkMail**: User test@gptpat.com created.
* **SES**: gptpat.com verified with "MAIL FROM" domain www.gptpat.com.

## **Challenges Faced**

1. **Nameserver Mismatch**: Registrar and hosted zone nameservers differed, requiring consolidation.
2. **Lightsail DNS Constraints**: Couldn’t delete Lightsail DNS zone due to WordPress dependency.
3. **UI Errors**: Lightsail MX input rejected combined priority/target values.
4. **Mailbox Oversight**: Missed creating a WorkMail user initially.
5. **Propagation Delays**: DNS changes took time to reflect globally.

## **Solutions Applied**

* **DNS Consolidation**: Moved all records to Lightsail’s DNS zone, aligning with registrar nameservers.
* **Record Correction**: Adjusted MX inputs to separate priority and target.
* **Mailbox Setup**: Added a WorkMail user to receive emails.
* **Patience**: Allowed time for DNS propagation and SES verification.

## **Lessons Learned**

* **DNS Authority**: Ensure registrar nameservers match the active hosted zone.
* **Service Integration**: Lightsail and WorkMail DNS need careful coordination.
* **Mailbox Requirement**: Email services require user accounts, not just DNS.
* **Documentation**: AWS console outputs and external tools (e.g., dnschecker.org) are invaluable for verification.
* **Persistence**: Complex issues require iterative troubleshooting and validation.

## **Impact**

* **Technical Skills**: Gained expertise in AWS DNS management, WorkMail, and SES.
* **Portfolio Addition**: Demonstrated real-world problem-solving for a resume highlight.
* **Functional Outcome**: gptpat.com now hosts a WordPress site and receives emails seamlessly.

## **Troubleshooting Guide for Similar Issues**

1. **Verify DNS Setup**:
   * Check registrar nameservers vs. hosted zone nameservers.
   * Use dnschecker.org to confirm MX propagation.
2. **Consolidate DNS**:
   * Choose one DNS manager (e.g., Lightsail or Route 53) and migrate all records.
3. **Add WorkMail Records**:
   * MX: 10 inbound-smtp.<region>.amazonaws.com
   * CNAME: autodiscover.<domain> autodiscover.mail.<region>.awsapps.com
   * TXT: SPF, DMARC, domain ownership.
4. **Set Up SES "MAIL FROM"**:
   * Add MX and TXT for a subdomain (e.g., www.<domain>).
5. **Create Mailbox**:
   * Add a user in WorkMail before testing.
6. **Test and Wait**:
   * Send test emails and allow 72 hours for full DNS propagation.

## **Conclusion**

This journey through AWS’s ecosystem taught me the intricacies of DNS management and service integration. By resolving nameserver conflicts, aligning Lightsail and WorkMail configurations, and setting up a mailbox, I turned a non-functional email setup into a success. This case study is a testament to my ability to troubleshoot complex cloud issues, making it a valuable asset for my technical portfolio.