

1 Release Notes for BIND Version 9.12.0

1.1 Introduction

BIND 9.12.0 is a new feature release of BIND. This document summarizes new features and functional changes that have been introduced on this branch, as well as features that have been deprecated or removed. With each development release leading up to the final BIND 9.12.0 release, this document will be updated with additional features added and bugs fixed.

1.2 Download

The latest versions of BIND 9 software can always be found at <http://www.isc.org/downloads/>. There you will find additional information about each release, source code, and pre-compiled versions for Microsoft Windows operating systems.

1.3 Security Fixes

- Addresses could be referenced after being freed during resolver processing, causing an assertion failure. The chances of this happening were remote, but the introduction of a delay in resolution increased them. This bug is disclosed in CVE-2017-3145. [RT #46839]

1.4 New Features

- Many aspects of **named** have been modified to improve query performance, and in particular, performance for delegation-heavy zones:
 - The additional cache ("acache") was found not to significantly improve performance and has been removed. As a result, the **acache-enable** and **acache-cleaning-interval** options no longer have any effect. For backwards compatibility, BIND will accept their presence in a configuration file, but will log a warning.
 - In place of the acache, **named** can now use a glue cache to speed up retrieval of glue records when sending delegation responses. Unlike acache, this feature is on by default; use **glue-cache no;** to disable it.
 - **minimal-responses** is now set to `no-auth-recursive` by default.
 - The **additional-from-cache** and **additional-from-auth** options no longer have any effect. **named** will log a warning if they are set.
 - Several functions have been refactored to improve performance, including name compression, owner name case restoration, hashing, and buffers.
 - When built with default **configure** options, **named** no longer fills memory with tag values when allocating or freeing it. This improves performance, but makes it more difficult to debug certain memory-related errors. The default is reversed if building with developer options. **named -M fill** or **named -M nofill** will set the behavior accordingly regardless of build options.
- Several areas of code have been refactored for improved readability, maintainability, and testability:
 - The **named** query logic implemented in **query_find()** has been split into smaller functions with a context structure to maintain state between them, and extensive comments have been added. [RT #43929]
 - Similarly the iterative query logic implemented in **resquery_response()** function has been split into smaller functions and comments added. [RT #45362]
- Code implementing name server query processing has been moved from **named** to an external library, **libns**. This will make it easier to write unit tests for the code, or to link it into new tools. [RT #45186]

- **named** can now synthesize negative responses (NXDOMAIN, NODATA, or wildcard answers) from cached DNSSEC-verified records that were returned in negative or wildcard responses from authoritative servers.

This will reduce query loads on authoritative servers for signed domains: when existing cached records can be used by the resolver to determine that a name does not exist in the authoritative domain, no query needs to be sent. Reducing the number of iterative queries should also improve resolver performance.

This behavior is controlled by the new `named.conf` option **synth-from-dnssec**. It is enabled by default.

Note: this currently only works for zones signed using NSEC. Support for zones signed using NSEC3 (without opt-out) is planned for the future.

Thanks to APNIC for sponsoring this work.

- When acting as a recursive resolver, **named** can now continue returning answers whose TTLs have expired when the authoritative server is under attack and unable to respond. This is controlled by the **stale-answer-enable**, **stale-answer-ttl** and **max-stale-ttl** options. [RT #44790]
- The DNS Response Policy Service (DNSRPS) API, a mechanism to allow **named** to use an external response policy provider, is now supported. (One example of such a provider is "FastRPZ" from Farsight Security, Inc.) This allows the same types of policy filtering as standard RPZ, but can reduce the workload for **named**, particularly when using large and frequently-updated policy zones. It also enables **named** to share response policy providers with other DNS implementations such as Unbound.

This feature is available if BIND is built with **configure --enable-dnsrps**, if a DNSRPS provider is installed, and if **dnsrps-enable** is set to "yes" in `named.conf`. Standard built-in RPZ is used otherwise.

Thanks to Farsight Security for the contribution. [RT #43376]

- Setting **max-journal-size** to `default` limits journal sizes to twice the size of the zone contents. This can be overridden by setting **max-journal-size** to `unlimited` or to an explicit value up to 2G. Thanks to Tony Finch for the contribution. [RT #38324]
- **dnstap** logfiles can now be configured to automatically roll when they reach a specified size. If **dnstap-output** is configured with mode `file`, then it can take optional **size** and **versions** key-value arguments to set the logfile rolling parameters. (These have the same semantics as the corresponding options in a **logging** channel statement.) [RT #44502]
- Logging channels and **dnstap-output** files can now be configured with a **suffix** option, set to either `increment` or `timestamp`, indicating whether log files should be given incrementing suffixes when they roll over (e.g., `logfile.0`, `.1`, `.2`, etc) or suffixes indicating the time of the roll. The default is `increment`. [RT #42838]
- The **print-time** option in the **logging** configuration can now take arguments **local**, **iso8601** or **iso8601-utc** to indicate the format in which the date and time should be logged. For backward compatibility, **yes** is a synonym for **local**. [RT #42585]

- The new **dnssec-cds** command generates a new DS set to place in a parent zone, based on the contents of a child zone's validated CDS or CDNSKEY records. It can produce a `dsset` file suitable for input to **dnssec-signzone**, or a series of **nsupdate** commands to update the parent zone via dynamic DNS. Thanks to Tony Finch for the contribution. [RT #46090]

- **nsupdate** and **rndc** now accept command line options **-4** and **-6** which force using only IPv4 or only IPv6, respectively. [RT #45632]

- **nsec3hash -r** ("rdata order") takes arguments in the same order as they appear in NSEC3 or NSEC3PARAM records. This makes it easier to generate an NSEC3 hash using values cut and pasted from an existing record. Thanks to Tony Finch for the contribution. [RT #45183]

- The **new-zones-directory** option allows **named** to store configuration parameters for zones added via **rndc addzone** in a location other than the working directory. Thanks to Petr Menšík of Red Hat for the contribution. [RT #44853]

- The **dnstap-read -x** option prints a hex dump of the wire format DNS message encapsulated in each **dnstap** log entry. [RT #44816]
- The **host -A** option returns most records for a name, but omits types RRSIG, NSEC and NSEC3.
- **dig +ednsopt** now accepts the names for EDNS options in addition to numeric values. For example, an EDNS Client-Subnet option could be sent using **dig +ednsopt=ecs:....**. Thanks to John Worley of Secure64 for the contribution. [RT #44461]
- Added support for the EDNS TCP Keepalive option (RFC 7828); this allows negotiation of longer-lived TCP sessions to reduce the overhead of setting up TCP for individual queries. [RT #42126]
- Added support for the EDNS Padding option (RFC 7830), which obfuscates packet size analysis when DNS queries are sent over an encrypted channel. [RT #42094]
- **rndc** commands which refer to zone names can now reference a zone of type **redirect** by using the special zone name "-redirect". (Previously this was not possible because **redirect** zones always have the name ".", which can be ambiguous.)
In the event you need to manipulate a zone actually called "-redirect", use a trailing dot: "-redirect."
Note: This change does not apply to the **rndc addzone** or **rndc modzone** commands.
- **named-checkconf -l** lists the zones found in `named.conf`. [RT #43154]
- Query logging now includes the ECS option, if one was present in the query, in the format "[ECS address/source/scope]".
- By default, BIND now uses the random number generation functions in the cryptographic library (i.e., OpenSSL or a PKCS#11 provider) as a source of high-quality randomness rather than `/dev/random`. This is suitable for virtual machine environments, which may have limited entropy pools and lack hardware random number generators.
This can be overridden by specifying another entropy source via the **random-device** option in `named.conf`, or via the **-r** command line option. However, for functions requiring full cryptographic strength, such as DNSSEC key generation, this *cannot* be overridden. In particular, the **-r** command line option no longer has any effect on **dnssec-keygen**.
This can be disabled by building with **configure --disable-crypto-rand**, in which case `/dev/random` will be the default entropy source. [RT #31459] [RT #46047]
- **rndc managed-keys destroy** shuts down all RFC 5011 DNSSEC trust anchor maintenance, and deletes any existing managed keys database. If immediately followed by **rndc reconfig**, this will reinitialize key maintenance just as if the server was being started for the first time.
This is intended for testing purposes, but can be used -- with extreme caution -- as a brute-force repair for unrecoverable problems with a managed keys database, to jumpstart the key acquisition process if `bind.keys` is updated, etc. [RT #32456]
- **dnssec-signzone -S** can now add or remove synchronization records (CDS and CDNSKEY) based on key metadata set by the **-Psync** and **-Dsync** options to **dnssec-keygen**, **dnssec-settime**, etc. [RT #46149]
- **dnssec-checkds -s** specifies a file from which to read a DS set rather than querying the parent zone. This can be used to check zone correctness prior to publication. Thanks to Niall O'Reilly [RT #44667]

1.5 Removed Features

- As noted above, the **acache-enable**, **acache-cleaning-interval**, **additional-from-cache** and **additional-from-auth** options are no longer effective and **named** will log a warning if they are set.
- The ISC DNSSEC Lookaside Validation (DLV) service has been shut down; all DLV records in the `dlv.isc.org` zone have been removed. References to the service have been removed from BIND documentation. Lookaside validation is no longer used by default by **delv**. The DLV key has been removed from `bind.keys`. Setting **dnssec-lookaside** to **auto** or to use `dlv.isc.org` as a trust anchor results in a warning being issued.

- The lightweight resolver daemon and library (**lwresd** and **liblwres**) have been removed. [RT #45186]
- **dig +sigchase** and related options **+trusted-keys** and **+topdown** have been removed. **delv** is now the recommended command for looking up records with DNSSEC validation. [RT #42793]
- The use of **dnssec-keygen** to generate HMAC keys for TSIG authentication has been deprecated in favor of **tsig-keygen**. If the algorithms HMAC-MD5, HMAC-SHA1, HMAC-SHA224, HMAC-SHA256, HMAC-SHA384, or HMAC-SHA512 are specified, **dnssec-keygen** will print a warning message. These algorithms will be removed from **dnssec-keygen** entirely in a future release. [RT #42272]
- The use of HMAC-MD5 for RNDG keys is no longer recommended. The default algorithm generated by **rndc-confgen** is now HMAC-SHA256. [RT #42272]
- The **isc-hmac-fixup** command, which was created to address an interoperability problem in TSIG keys between early versions of BIND and other DNS implementations, is now obsolete and has been removed. [RT #46411]
- Windows XP and Windows 2003 are no longer supported platforms for BIND; "XP" binaries are no longer available for download from ISC.

1.6 Protocol Changes

- BIND can now use the Ed25519 and Ed448 Edwards Curve DNSSEC signing algorithms described in RFC 8080. Note, however, that these algorithms must be supported in OpenSSL; currently they are only available in the development branch of OpenSSL at <https://github.com/openssl/openssl>. [RT #44696]
- When parsing DNS messages, EDNS KEY TAG options are checked for correctness. When printing messages (for example, in **dig**), EDNS KEY TAG options are printed in readable format.

1.7 Feature Changes

- **named** will no longer start or accept reconfiguration if the working directory (specified by the **directory** option) or the managed-keys directory (specified by **managed-keys-directory**) are not writable by the effective user ID. [RT #46077]
- Initializing keys specified in a **managed-keys** statement or by **dnssec-validation auto;** are now tagged as "initializing", until they have been updated by a key refresh query. If key maintenance fails to initialize, this will be visible when running **rndc secroots**. [RT #46267]
- Previously, **update-policy local;** accepted updates from any source so long as they were signed by the locally-generated session key. This has been further restricted; updates are now only accepted from locally configured addresses. [RT #45492]
- **dnssec-keygen** no longer has default algorithm settings. It is necessary to explicitly specify the algorithm on the command line with the **-a** option when generating keys. This may cause errors with existing signing scripts if they rely on current defaults. The intent is to reduce the long-term cost of transitioning to newer algorithms in the event of RSASHA1 being deprecated. [RT #44755]
- The Response Policy Zone (RPZ) implementation has been substantially refactored: updates to the RPZ summary database are no longer directly performed by the zone database but by a separate function that is called when a policy zone is updated. This improves both performance and reliability when policy zones receive frequent updates. Summary database updates can be rate-limited by using the **min-update-interval** option in a **response-policy** statement. [RT #43449]
- **dnstap** now stores both the local and remote addresses for all messages, instead of only the remote address. The default output format for **dnstap-read** has been updated to include these addresses, with the initiating address first and the responding address second, separated by "->" or "<-" to indicate in which direction the message was sent. [RT #43595]

- Expanded and improved the YAML output from **dnstap-read -y**: it now includes packet size and a detailed breakdown of message contents. [RT #43622] [RT #43642]
- Threads in **named** are now set to human-readable names to assist debugging on operating systems that support that. Threads will have names such as "isc-timer", "isc-sockmgr", "isc-worker0001", and so on. This will affect the reporting of subsidiary thread names in **ps** and **top**, but not the main thread. [RT #43234]
- If an ACL is specified with an address prefix in which the prefix length is longer than the address portion (for example, 192.0.2.1/8), it will now be treated as a fatal error during configuration. [RT #43367]
- **dig** now warns about .local queries which are reserved for Multicast DNS. [RT #44783]
- The view associated with the query is now logged unless it is "_default/IN" or "_dnsclient/IN" when logging DNSSEC validator messages.
- When **named** was reconfigured, failure of some zones to load correctly could leave the system in an inconsistent state; while generally harmless, this could lead to a crash later when using **rndc addzone**. Reconfiguration changes are now fully rolled back in the event of failure. [RT #45841]
- Multiple **cookie-secret** clauses are now supported. The first **cookie-secret** in **named.conf** is used to generate new server cookies. Any others are used to accept old server cookies or those generated by other servers using the matching **cookie-secret**.
- A new statistics counter has been added to track prefetch queries. [RT #45847]
- A new statistics counter has been added to track priming queries. [RT #46313]
- The **dnssec-signzone -x** flag and the **dnssec-dnskey-kskonly** option in **named.conf**, which suppress the use of the ZSK when signing DNSKEY records, now also apply to CDNSKEY and CDS records. Thanks to Tony Finch for the contribution. [RT #45689]
- Trust anchor telemetry messages, as specified by RFC 8145, are now logged to the **trust-anchor-telemetry** logging category.
- The **filter-aaaa-on-v4** and **filter-aaaa-on-v6** options are no longer conditionally compiled in **named**. [RT #46340]

1.8 Bug Fixes

- Attempting to validate improperly unsigned CNAME responses from secure zones could cause a validator loop. This caused a delay in returning SERVFAIL and also increased the chances of encountering the crash bug described in CVE-2017-3145. [RT #46839]
- Zones created with **rndc addzone** could temporarily fail to inherit the **allow-transfer** ACL set in the **options** section of **named.conf**. [RT #46603]
- The introduction of **libns** caused a bug in which TCP client objects were not recycled after use, leading to unconstrained memory growth. [RT #46029]
- Some header files included `<isc/util.h>` incorrectly as it pollutes with namespace with non ISC_ macros and this should only be done by explicitly including `<isc/util.h>`. This has been corrected. Some code may depend on `<isc/util.h>` being implicitly included via other header files. Such code should explicitly include `<isc/util.h>`.
- **named** failed to properly determine whether there were active KSK and ZSK keys for an algorithm when **update-check-ksk** was true (which is the default setting). This could leave records unsigned when rolling keys. [RT #46743] [RT #46754] [RT #46774]

1.9 License

BIND is open source software licenced under the terms of the Mozilla Public License, version 2.0 (see the `LICENSE` file for the full text).

The license requires that if you make changes to BIND and distribute them outside your organization, those changes must be published under the same license. It does not require that you publish or disclose anything other than the changes you have made to our software. This requirement does not affect anyone who is using BIND, with or without modifications, without redistributing it, nor anyone redistributing BIND without changes.

Those wishing to discuss license compliance may contact ISC at <https://www.isc.org/mission/contact/>.

1.10 End of Life

The end-of-life date for BIND 9.12 has not yet been determined. However, it is not intended to be an Extended Support Version (ESV) branch; accordingly, support will end after the next stable branch (9.14) becomes available. Those needing a longer-lived branch are encouraged to use the current ESV, BIND 9.11, which will be supported until December 2021. See <https://www.isc.org/downloads/software-support-policy/> for details of ISC's software support policy.

1.11 Thank You

Thank you to everyone who assisted us in making this release possible. If you would like to contribute to ISC to assist us in continuing to make quality open source software, please visit our donations page at <http://www.isc.org/donate/>.