SOA record

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A **Start of Authority record** (abbreviated as **SOA record**) is a type of [resource record](https://en.wikipedia.org/wiki/Resource_record) in the [Domain Name System](https://en.wikipedia.org/wiki/Domain_Name_System) (DNS) containing administrative information about the zone, especially regarding [zone transfers](https://en.wikipedia.org/wiki/DNS_zone_transfer). The SOA record format is specified in [RFC 1035](https://tools.ietf.org/html/rfc1035).[[1]](https://en.wikipedia.org/wiki/SOA_record#cite_note-RFC_1035-1)



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Background[[edit](https://en.wikipedia.org/w/index.php?title=SOA_record&action=edit&section=1)]

Normally DNS name servers are set up in clusters. The database within each cluster is synchronized through zone transfers. The SOA record for a zone contains data to control the zone transfer. This is the serial number and different timespans.

It also contains the [email address](https://en.wikipedia.org/wiki/Email_address) of the responsible person for this zone, as well as the name of the primary master name server. Usually the SOA record is located at the top of the zone. A zone without a SOA record does not conform to the standard required by [RFC 1035](https://tools.ietf.org/html/rfc1035).

Structure[[edit](https://en.wikipedia.org/w/index.php?title=SOA_record&action=edit&section=2)]

**name**

name of the zone

**IN**

zone class (usually IN for internet)

**SOA**

abbreviation for *Start of Authority*

**MNAME**

Primary master name server for this zone

* [UPDATE requests](https://en.wikipedia.org/wiki/Dynamic_DNS) should be forwarded toward the primary master[[2]](https://en.wikipedia.org/wiki/SOA_record#cite_note-RFC_2136-2)
* [NOTIFY requests](https://en.wikipedia.org/wiki/Dynamic_DNS) propagate outward from the primary master[[3]](https://en.wikipedia.org/wiki/SOA_record#cite_note-RFC_1996-3)

**RNAME**

Email address of the administrator responsible for this zone. (As usual, the email address is encoded as a name. The part of the email address before the @ becomes the first label of the name; the domain name after the @ becomes the rest of the name. In zone-file format, dots in labels are escaped with backslashes; thus the email address john.doe@example.com would be represented in a zone file as john\.doe.example.com.)

**SERIAL**

Serial number for this zone. If a secondary name server slaved to this one observes an increase in this number, the slave will assume that the zone has been updated and initiate a [zone transfer](https://en.wikipedia.org/wiki/DNS_zone_transfer).

**REFRESH**

number of seconds after which secondary name servers should query the master for the SOA record, to detect zone changes. Recommendation for small and stable zones:[[4]](https://en.wikipedia.org/wiki/SOA_record#cite_note-RIPE_203-4) 86400 seconds (24 hours).

**RETRY**

number of seconds after which secondary name servers should retry to request the serial number from the master if the master does not respond. It must be less than *Refresh*. Recommendation for small and stable zones:[[4]](https://en.wikipedia.org/wiki/SOA_record#cite_note-RIPE_203-4) 7200 seconds (2 hours).

**EXPIRE**

number of seconds after which secondary name servers should stop answering request for this zone if the master does not respond. This value must be bigger than the sum of *Refresh* and *Retry*. Recommendation for small and stable zones:[[4]](https://en.wikipedia.org/wiki/SOA_record#cite_note-RIPE_203-4) 3600000 seconds (1000 hours).

**TTL, a.k.a. MINIMUM**

[Time to live](https://en.wikipedia.org/wiki/Time_to_live#DNS_records) for purposes of negative caching. Recommendation for small and stable zones:[[4]](https://en.wikipedia.org/wiki/SOA_record#cite_note-RIPE_203-4) 172800 seconds (2 days). Originally this field had the meaning of a *minimum* TTL value for resource records in this zone; it was changed to its current meaning by [RFC 2308](https://tools.ietf.org/html/rfc2308).[[5]](https://en.wikipedia.org/wiki/SOA_record#cite_note-RFC_2308-5)

Sample SOA record in [BIND](https://en.wikipedia.org/wiki/BIND) syntax[[edit](https://en.wikipedia.org/w/index.php?title=SOA_record&action=edit&section=3)]

Sample SOA record for example.org

$TTL 86400

@ IN SOA ns.icann.org. noc.dns.icann.org. (

2020080302 ;Serial

7200 ;Refresh

3600 ;Retry

1209600 ;Expire

3600 ;Minimum TTL

)

Serial number changes[[edit](https://en.wikipedia.org/w/index.php?title=SOA_record&action=edit&section=4)]

*Main article:*[*Serial number arithmetic*](https://en.wikipedia.org/wiki/Serial_number_arithmetic)

Several methods have been established for updates to the SERIAL field of a zone's SOA record:

* The serial number begins at 1, and is simply incremented at every change.
* The serial number contains the date of the last change (in [ISO 8601](https://en.wikipedia.org/wiki/ISO_8601) basic format) followed by a two-digit counter (e.g. 2017031405 = the fifth change dated March 14, 2017). This method is recommended in [RFC 1912](https://tools.ietf.org/html/rfc1912).[[6]](https://en.wikipedia.org/wiki/SOA_record#cite_note-RFC_1912-6)
* The serial number is the time of last modification to the zone's data file expressed as the number of seconds since the [UNIX epoch](https://en.wikipedia.org/wiki/Unix_time). This method is used by default in the [djbdns](https://en.wikipedia.org/wiki/Djbdns) suite.[[7]](https://en.wikipedia.org/wiki/SOA_record#cite_note-7) Although it uses a 32-bit counter, it is not susceptible to the [year 2038 problem](https://en.wikipedia.org/wiki/Year_2038_problem) due to the effect of [serial number arithmetic](https://en.wikipedia.org/wiki/Serial_number_arithmetic).

References[[edit](https://en.wikipedia.org/w/index.php?title=SOA_record&action=edit&section=5)]

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2. [**^**](https://en.wikipedia.org/wiki/SOA_record#cite_ref-RFC_2136_2-0) [*"RFC 2136 — Dynamic Updates in the Domain Name System (DNS UPDATE)"*](https://tools.ietf.org/html/rfc2136)*. April 1997. Retrieved 2017-12-28.*
3. [**^**](https://en.wikipedia.org/wiki/SOA_record#cite_ref-RFC_1996_3-0) [*"RFC 1996 — A Mechanism for Prompt Notification of Zone Changes (DNS NOTIFY)"*](https://tools.ietf.org/html/rfc1996)*. August 1996. Retrieved 2017-12-28.*
4. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/SOA_record#cite_ref-RIPE_203_4-0) [***b***](https://en.wikipedia.org/wiki/SOA_record#cite_ref-RIPE_203_4-1) [***c***](https://en.wikipedia.org/wiki/SOA_record#cite_ref-RIPE_203_4-2) [***d***](https://en.wikipedia.org/wiki/SOA_record#cite_ref-RIPE_203_4-3) [*"RIPE 203 — Recommendations for DNS SOA Values"*](https://www.ripe.net/publications/docs/ripe-203)*. 1999-06-07. Retrieved 2017-12-28. These recommendations are aimed at small and stable DNS zones.*
5. [**^**](https://en.wikipedia.org/wiki/SOA_record#cite_ref-RFC_2308_5-0) [*"RFC 2308 — Negative Caching of DNS Queries (DNS NCACHE)"*](https://tools.ietf.org/html/rfc2308)*. March 1998. Retrieved 2017-12-28.*
6. [**^**](https://en.wikipedia.org/wiki/SOA_record#cite_ref-RFC_1912_6-0) [*"RFC 1912 — Common DNS Operational and Configuration Errors"*](https://tools.ietf.org/html/rfc1912)*. February 1996. Retrieved 2017-12-28.*
7. [**^**](https://en.wikipedia.org/wiki/SOA_record#cite_ref-7) <https://cr.yp.to/djbdns/run-server-bind.html>