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Here's a comparison of the **Always On Availability Groups** feature across SQL Server 2012, 2014, 2016, 2017, 2019, and 2022.

Feature/Version	SQL Server 2012	SQL Server 2014	SQL Server 2016	SQL Server 2017	SQL Server 2019	SQL Server 2022
Introduction of Always On	Introduced Always On Availability Groups for HA/DR	Similar to SQL Server 2012 with minor improvements	Significant enhancements with distributed transactions support, automatic failover for readable secondaries, and DTC support	Added read scale-out scenarios, distributed availability groups	Added support for Kubernetes and Managed Instance failover, intelligent query processing improvements	Enhanced with Azure Arc support, SQL Server Ledger, further integration with cloud-based environments
Replica Types	1 primary and up to 4 secondary replicas	1 primary and up to 4 secondary replicas	1 primary and up to 8 secondary replicas	1 primary and up to 8 secondary replicas	1 primary and up to 8 secondary replicas	1 primary and up to 8 secondary replicas
Synchronous/Asynchronous Commit Modes	2 synchronous replicas, other replicas in asynchronous mode	2 synchronous replicas, other replicas in asynchronous mode	3 synchronous replicas for better failover flexibility	3 synchronous replicas, more flexibility in choosing failover partners	3 synchronous replicas, improved flexibility for disaster recovery	3 synchronous replicas, more seamless cloud integration, faster failover options
Automatic Failover	Supported with 2 synchronous replicas	Supported with 2 synchronous replicas	Automatic failover for readable secondaries added	Same as SQL Server 2016	Enhanced failover and multi-site failover with distributed AGs	Faster, more resilient failover with cross-site automatic failover capabilities

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Read-Only Routing	Supported, but limited to specific scenarios	Same as SQL Server 2012	Enhanced **read-only routing** for better load balancing	Optimized for **read-scale scenarios** in Always On	Further enhancements for **Kubernetes** environments and containerized workloads	**Improved read scalability, Azure Arc enabled,** better cloud read load balancing
Distributed Availability Groups	Not Available	Not Available	Introduced for **multi-data center DR,** spanning AGs across multiple clusters	Distributed AG improvements for **geo-distributed setups**	**Kubernetes Distributed AGs, Managed Instance failover**	**Distributed Availability Groups** with **cloud-native** and **on-prem hybrid** capabilities
Basic Availability Groups (Standard Edition)	Not Available	Not Available	Introduced in **SQL Server Standard** edition with 1 database, 1 replica	Available in **SQL Server Standard**	Same as SQL Server 2017	Same as SQL Server 2017
DTC Support (Distributed Transactions)	Not Available	Not Available	Introduced **DTC support for Availability Groups**	Same as SQL Server 2016	Improved **DTC support,** allowing more complex transactions	Same as SQL Server 2019
Failover Cluster Instances (FCI)	Integrated with Always On but independent of AGs	Integrated with Always On but independent of AGs	Enhanced to allow AGs on **FCIs,** improving HA flexibility	Same as SQL Server 2016	Further **AG on FCI** improvements, especially in **Kubernetes** setups	**Improved FCI support** in hybrid environments (Azure, Arc)

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Load Balancing	Manual routing for read-only queries	Same as SQL Server 2012	Read-Only Routing List introduced, allowing better load distribution	Improved Read-Scale AGs for load balancing across secondaries	Read-Scale Load Balancing in cloud environments, improved query performance	Better load balancing with cloud-native and on-prem instances
Cross-Domain Availability Groups	Limited	Limited	Cross-domain failover support for complex DR scenarios	Cross-domain improvements for geo-distributed architectures	Optimized for Kubernetes and cross-domain failovers	Further cross-domain failover optimization with Azure Arc
Monitoring & Diagnostics	Basic monitoring via DMV and system health sessions	Same as SQL Server 2012	Availability Group Dashboard for improved monitoring, Query Store integration	Same as SQL Server 2016	Integrated monitoring with cloud environments, improvements in Query Store	Enhanced diagnostics with integration to Azure Monitor, improved query insights

Key Improvements Across Versions:

- **SQL Server 2012**: Introduced **Always On Availability Groups** as a new HA/DR solution, replacing Database Mirroring.
- **SQL Server 2014**: Minor improvements to the feature but maintained the same architecture.
- **SQL Server 2016**: Major improvements with **automatic failover for readable secondaries**, support for **Distributed Transactions (DTC)**, and increased synchronous replicas.
- **SQL Server 2017**: Optimized for **read-scale** scenarios, and introduced **Distributed Availability Groups** for geo-distributed DR.
- **SQL Server 2019**: Integration with **Kubernetes**, **Big Data Clusters**, and enhanced support for **Managed Instances** and **distributed AGs**.
- **SQL Server 2022**: **Azure Arc** integration, **ledger** for blockchain, and further enhancements for **distributed AGs**, providing better cloud-native, hybrid, and cross-domain solutions. **Faster failover**, better monitoring, and seamless integration with cloud services.

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This comparison highlights how **Always On Availability Groups** evolved across these versions, from its inception in SQL Server 2012 to full hybrid and cloud-native capabilities in SQL Server 2022.