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Comparison of Kubernetes Ingress controllers

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State sharing

Ingress Nginx	Kong	Apache APISIX	Azure App Gateway Ingress	Nginx+	HAProxy Tech	HAProxy (cmoraisjr)	Voyager	Istio Ingress	Contour	Emissary-Ingress (ex-Ambassador)	Gloo	Traefik	Skipper	Citrix Ingress	GKE Ingress	ALB Ingress	AKO	KrakenD	Tyk
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Refer issue: <https://github.com/kubernetes/ingress-gce/issues/670>

Rate limit:

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or curifense

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WAF needs to be prepared separately though with ACL blocking (or releasing) specific IPs with IPSet
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- [125] Authentication/Authorization:
Possible with using google Identity Aware Proxy (IAP)
Docs: <https://cloud.google.com/iap/docs/enabling-kubernetes-howto>
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Enterprise:

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Docs: <https://cloud.google.com/iap/docs/enabling-kubernetes-howto>

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[146] Thanks to Config Snippet: <https://github.com/haproxytech/kubernetes-ingress/blob/master/documentation/annotations.md#config-snippet>

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[150] This is supported to Contour via matching on the :method pseudo-header

[151] <https://www.getambassador.io/docs/latest/topics/using/method/>

[152] Thanks to Config Snippet: <https://github.com/haproxytech/kubernetes-ingress/blob/master/documentation/annotations.md#config-snippet>

[153] Headers, Querystrings and Methods are not supported in the Ingress manifest. You need to use the configuration snippet and configure Nginx directly:
<https://kubernetes.github.io/ingress-nginx/user-guide/nginx-configuration/annotations/#configuration-snippet>

[154] Traffic routing:
<https://docs.konghq.com/2.0.x/proxy/#routes-and-matching-capabilities>

[155] All routing techniques supported by nginx is supported. Use raw config
More here: <https://github.com/nginxinc/kubernetes-ingress/blob/00618a60c3419348411df4ba805a9827e3e8520a/docs-web/configuration/ingress-resources/advanced-configuration-with-snippets.md#advanced-configuration-with-snippets>

[156] - Routing
HTTP Routing section
<https://www.haproxy.com/blog/using-haproxy-as-an-api-gateway-part-1/>

[157] - Routing
<https://voyagermesh.com/docs/7.1.1/guides/ingress/http/virtual-hosting/#hostname-based-routing>

[158] - Routing
<https://istio.io/latest/docs/concepts/traffic-management/#routing-rules>

<https://istio.io/latest/docs/reference/config/networking/virtual-service/#HTTPRoute>

[159] - Routing
<https://github.com/projectcontour/contour/blob/main/site/docs/v1.0.0/ingressroute.md>

[160] - Routing

https://docs.solo.io/gloo/latest/introduction/traffic_management/

[161] - Routing

<https://doc.traefik.io/traefik/routing/routers/>

[162] Predicates match routes:

<https://opensource.zalando.com/skipper/reference/predicates/>

Route processing:

<https://opensource.zalando.com/skipper/reference/architecture/#route-processing>

How features are exposed to users via Ingress <https://opensource.zalando.com/skipper/kubernetes/ingress-usage/>

For more complex routes we support Routegroups <https://opensource.zalando.com/skipper/kubernetes/routegroups/>

[163] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/crds/content-routing/>

[164] GLBC supports only Host and Path routing, documented here: <https://cloud.google.com/load-balancing/docs/url-map>

In the github repository was able to find only Host and Path based routing.

<https://github.com/kubernetes/ingress-gce/search?q=routing>

[165] Rules Example:

<https://kubernetes-sigs.github.io/aws-load-balancer-controller/latest/guide/ingress/annotations/#traffic-routing>

[166] <https://avinetworks.com/docs/20.1/http-request-policy/>

<https://github.com/avinetworks/avi-helm-charts/blob/master/docs/AKO/crds/hostrule.md>

[167] Active and passive healthchecks for upstreams

[168] <https://docs.konghq.com/2.2.x/health-checks-circuit-breakers/>

[169] <https://github.com/apache/apisix-ingress-controller/issues/117>

[170] <https://docs.microsoft.com/en-us/azure/application-gateway/ingress-controller-add-health-probes>

[171] <https://docs.nginx.com/nginx/admin-guide/load-balancer/tcp-health-check/>

- [172] <https://www.haproxy.com/documentation/aloha/latest/traffic-management/lb-layer7/health-checks/>
- [173] <https://www.haproxy.com/documentation/aloha/latest/traffic-management/lb-layer7/health-checks/>
- [174] <https://voyagemesh.com/docs/10.0.0/guides/ingress/configuration/health-check/>
- [175] <https://istio.io/latest/docs/ops/configuration/mesh/app-health-check/>
- [176] <https://projectcontour.io/docs/main/httpproxy/#per-route-health-checking>
- [177] <https://www.getambassador.io/docs/latest/topics/running/diagnostics/#health-status>
- [178] https://docs.solo.io/gloo/1.1.0/gloo_routing/gateway_configuration/health_checks/
- [179] relies on Kubernetes readinessProbes and skipper handled retries
- [180] https://cloud.google.com/kubernetes-engine/docs/concepts/ingress#health_checks
- [181] <https://kubernetes-sigs.github.io/aws-load-balancer-controller/latest/guide/ingress/annotations/#health-check>
- [182] <https://avinetworks.com/docs/20.1/overview-of-health-monitors/>
- [183] The healthchecks can be configured manually by the user by creating an endpoint, but there is no automated system providing this feature.
- [184] <https://kubernetes.github.io/ingress-nginx/user-guide/nginx-configuration/annotations/#custom-timeouts>
- [185] <https://docs.konghq.com/2.2.x/proxy/#4-errors--retries>
- [186] <https://github.com/apache/apisix-ingress-controller/issues/118>
- [187] <https://docs.microsoft.com/en-us/azure/application-gateway/ingress-controller-add-health-probes>
- [188] <https://www.haproxy.com/blog/haproxy-layer-7-retries-and-chaos-engineering/>
- [189] <https://www.haproxy.com/blog/haproxy-layer-7-retries-and-chaos-engineering/>
- [190] <https://istio.io/latest/docs/concepts/traffic-management/#retries>
- [191] <https://projectcontour.io/docs/main/httpproxy/#response-timeout>

[192] https://docs.solo.io/gloo/latest/introduction/traffic_management/

[193] <https://doc.traefik.io/traefik/middlewares/retry/#retry>

[194] automated retry in case of TCP/TLS connect to backend was not possible

[195] <https://avinetworks.com/docs/20.1/http-server-reselect/>

[196] <https://docs.konghq.com/2.2.x/health-checks-circuit-breakers/#passive-health-checks-circuit-breakers>

[197] <https://github.com/apache/apisix-ingress-controller/issues/117>

[198] <https://www.nginx.com/blog/announcing-nginx-ingress-controller-for-kubernetes-release-1-7-0/#circuit-breaker>

[199] <https://www.haproxy.com/blog/circuit-breaking-haproxy/>

[200] <https://istio.io/latest/docs/concepts/traffic-management/#circuit-breakers>

[201] <https://www.getambassador.io/docs/latest/topics/using/circuit-breakers/>

[202] <https://doc.traefik.io/traefik/middlewares/circuitbreaker/>

[203] configurable per route via filters

<https://opensource.zalando.com/skipper/reference/filters/#ratebreaker>

<https://opensource.zalando.com/skipper/reference/filters/#consecutivebreaker>

[204] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/multicluster/multi-cluster/#round-robin-deployment>

[205] Nginx plus only:

<https://github.com/nginxinc/kubernetes-ingress/tree/v1.9.0/examples/session-persistence>

[206] consistentHash algorithm is sticky until backends scales up/down

[207] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/how-to/session-affinity/#source-ip-address-persistence>

[208] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/configure/annotations/#sample-ingress-yaml-with-smart-annotations>

[209] <https://projectcontour.io/docs/v1.22.1/config/request-routing/#load-balancing-strategy>

[210] free until 5 req/s

[211] For Citrix ingress controller Cache Array Routing Protocol (CARP) is the default:
<https://docs.citrix.com/en-us/citrix-adc/current-release/load-balancing/load-balancing-customizing-algorithms/hashing-methods.html#consistent-hashing-algorithms>

There are many parameter that can used for hashing like URL hash method ,Source IP hash method:

<https://docs.citrix.com/en-us/citrix-adc/current-release/load-balancing/load-balancing-customizing-algorithms/hashing-methods.html>

[212] <https://research.google/pubs/pub44824/>

[213] free until 5 req/s

[214] EMWA: moving average of each replica's RTT, weighted by the number of outstanding requests, and distribute traffic to replicas where that cost function is smallest.

[215] random least two: Take two backends random, and choose the better

<https://www.nginx.com/blog/nginx-power-of-two-choices-load-balancing-algorithm/>

[216] <https://www.nginx.com/blog/nginx-power-of-two-choices-load-balancing-algorithm/>

[217] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/multicluster/multi-cluster/>

[218] <https://doc.traefik.io/traefik/providers/file/>

[219] <https://github.com/citrix/citrix-k8s-ingress-controller/blob/master/docs/how-to/external-load-balance-adc.md>

[220] <https://kubernetes.github.io/ingress-nginx/user-guide/nginx-configuration/annotations/#custom-nginx-load-balancing>

[221] - Algorithms
Check algorithm attribute

<https://docs.konghq.com/2.2.x/admin-api/#upstream-object>

[222] lb Setting:

<https://docs.nginx.com/nginx-ingress-controller/configuration/ingress-resources/advanced-configuration-with-annotations/#backend-services-upstreams>

[223] - Algorithms

check balance section in

<https://cbonte.github.io/haproxy-dconv/2.0/configuration.html>

[224] - Algorithms

<https://voyagermesh.com/docs/10.0.0/guides/ingress/configuration/loadbalance-algorithm/>

[225] - Algorithms

<https://istio.io/latest/docs/reference/config/networking/destination-rule/>

[226] - Algorithms

<https://github.com/projectcontour/contour/blob/main/design/ingressroute-design.md#load-balancing>

[227] - Algorithms

<https://www.getambassador.io/docs/latest/topics/running/load-balancer/>

[228] - Algorithms

https://docs.solo.io/gloo/1.3.0/api/github.com/solo-io/gloo/projects/gloo/api/v1/load_balancer.proto.sk/

[229] - Algorithms

<https://doc.traefik.io/traefik/routing/providers/kubernetes-crd/#server-load-balancing>

[230] <https://opensource.zalando.com/skipper/reference/backends/#load-balancer-backend>

power of N choices based on HTTP requests is an open PR

[231] List from github code. Couldn't find clear documentation.

<https://github.com/kubernetes/ingress-gce/blob/6c3ddf60041c71718d7b67c753cc8c44b25afb02/pkg/composite/gen.go#L425>

[232] Couldn't find proper docs for config.

ELB supports RR and Least Connections

<https://docs.aws.amazon.com/elasticloadbalancing/latest/userguide/how-elastic-load-balancing-works.html#request-routing>

Github Code: https://github.com/kubernetes-sigs/aws-load-balancer-controller/blob/9776d298ddc1bb7fe9245510467d2507580ec96/internal/alb/tg/attributes_test.go#L148

[233] Avi supports many more algorithms

LB Algorithms: <https://avinetworks.com/docs/20.1/load-balancing-algorithms/>

HTTPRule CRD: <https://github.com/avinetworks/avi-helm-charts/blob/master/docs/AKO/crds/httprule.md>

[234] <https://kubernetes.github.io/ingress-nginx/user-guide/nginx-configuration/annotations/#authentication>

[235] <https://docs.konghq.com/hub/kong-inc/basic-auth/>

[236] https://cbonte.github.io/haproxy-dconv/2.2/configuration.html#7.3.6-http_auth

[237] https://cbonte.github.io/haproxy-dconv/2.0/configuration.html#7.3.6-http_auth

[238] <https://voyagemesh.com/docs/7.1.1/guides/ingress/security/basic-auth/>

[239] <https://github.com/istio/proxy/pull/2954/files>

[240] Also requires running additional deployment, which doesn't have a built image
<https://github.com/projectcontour/contour-authserver>

[241] <https://www.getambassador.io/docs/latest/howtos/basic-auth/>

[242] https://docs.solo.io/gloo-edge/latest/guides/security/auth/extauth/basic_auth/

[243] <https://doc.traefik.io/traefik/middlewares/basicauth/>

[244] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/crds/auth/#basic-authentication>

[245] <https://avinetworks.com/docs/latest/architectural-overview/applications/virtual-services/create-virtual-service/#http-basic-authentication>

[246] <https://kubernetes.github.io/ingress-nginx/user-guide/nginx-configuration/annotations/#external-authentication>

[247] <https://konghq.com/blog/custom-authentication-and-authorization-framework-with-kong/>

[248] <https://docs.nginx.com/nginx/admin-guide/security-controls/configuring-subrequest-authentication/>

[249] <https://haproxy-ingress.github.io/v0.13/docs/configuration/keys/#auth-external>

[250] <https://github.com/projectcontour/contour-authserver>

[251] <https://www.getambassador.io/docs/latest/topics/running/services/auth-service/#configure-an-external-authservice>

[252] <https://docs.solo.io/gloo-edge/latest/guides/security/auth/extauth/>

[253] <https://doc.traefik.io/traefik/middlewares/forwardauth/>

[254] <https://opensource.zalando.com/skipper/reference/filters/#webhook>

[255] <https://cloud.google.com/iap/docs/quickstart-external-identities>

[256] <https://kubernetes.github.io/ingress-nginx/examples/auth/client-certs/>

[257] <https://docs.konghq.com/hub/kong-inc/mtls-auth/>

[258] <https://learn.microsoft.com/en-us/azure/application-gateway/mutual-authentication-overview>

[259] Ingress mTLS, egress mTLS, and upstream mTLS.

[260] <https://www.loadbalancer.org/blog/client-certificate-authentication-with-haproxy/>

[261] <https://www.loadbalancer.org/blog/client-certificate-authentication-with-haproxy/>

[262] <https://istio.io/latest/docs/tasks/security/authentication/authn-policy/>

<https://istio.io/latest/docs/tasks/traffic-management/ingress/secure-ingress/#configure-a-mutual-tls-ingress-gateway>

[263] <https://www.getambassador.io/docs/latest/howtos/client-cert-validation/>

[264] <https://doc.traefik.io/traefik/https/tls/#client-authentication-mtls>

[265] not accessible to the user by Kubernetes resources

[266] <https://github.com/citrix/citrix-k8s-ingress-controller/blob/5e357361726988a4a01691c9a14dfd4f80c6e9a1/docs/certificate-management/client-auth-support.md>

<https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/certificate-management/client-auth-support/>

[267] <https://avinetworks.com/docs/20.1/client-ssl-certificate-validation/>

[268] <https://docs.konghq.com/hub/kong-inc/oauth2/>

[269] <https://github.com/nginxinc/kubernetes-ingress/issues/982>

[270] <https://www.haproxy.com/blog/using-haproxy-as-an-api-gateway-part-2-authentication/>

[271] <https://www.haproxy.com/blog/using-haproxy-as-an-api-gateway-part-2-authentication/>

[272] free until 5 req/s

<https://www.getambassador.io/docs/latest/howtos/oauth-oidc-auth/>

[273] <https://docs.solo.io/gloo-edge/latest/guides/security/auth/extauth/oauth/>

[274] <https://doc.traefik.io/traefik-enterprise/middlewares/oauth-intro/>

[275] oauth sv2svc via tokeninfo and tokenintrospection

OAuth2 UI flow via lua script, but native implementation is in the pipe and right now tested internally.

[276] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/crds/auth/#oauth-authentication>

[277] https://kubernetes-sigs.github.io/aws-load-balancer-controller/latest/guide/tasks/cognito_authentication/#cognito-configuration

[278] <https://docs.konghq.com/hub/kong-inc/openid-connect/>

[279] <https://istio.io/latest/blog/2019/app-identity-and-access-adapter/#protecting-web-applications>

[280] <https://docs.solo.io/gloo-edge/latest/guides/security/auth/extauth/opa/>

[281] <https://doc.traefik.io/traefik-enterprise/middlewares/oidc/>

[282] <https://github.com/citrix/citrix-k8s-ingress-controller/releases>

[283] https://cloud.google.com/iap/docs/authentication-howto#obtaining_an_oidc_token_for_the_default_service_account

[284] <https://docs.konghq.com/hub/kong-inc/jwt/>

[285] <https://istio.io/latest/docs/concepts/security/#request-authentication>

[286] <https://www.getambassador.io/docs/latest/topics/using/filters/jwt/>

[287] <https://docs.solo.io/gloo-edge/latest/guides/security/auth/jwt/>

[288] <https://doc.traefik.io/traefik-enterprise/middlewares/jwt/>

[289] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/crds/auth/>

[290] <https://cloud.google.com/iap/docs/signed-headers-howto>

[291] <https://www.krakend.io/docs/authorization/jwt-overview/>

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<https://avinetworks.com/docs/20.1/jwt-validation/>

[293] <https://docs.konghq.com/hub/kong-inc/ldap-auth/>

[294] <https://github.com/nginxinc/nginx-ldap-auth>

[295] <https://docs.solo.io/gloo-edge/latest/guides/security/auth/extauth/ldap/>

[296] <https://doc.traefik.io/traefik-enterprise/middlewares/ldap/>

[297] <https://cloud.google.com/iap/docs/concepts-overview#authentication>

[298] <https://avinetworks.com/docs/18.2/ldap-authentication/>

[299] <https://docs.konghq.com/hub/kong-inc/hmac-auth/>

[300] https://github.com/nginx-modules/nginx_http_hmac_secure_link_module

[301] <https://doc.traefik.io/traefik-enterprise/middlewares/hmac/>

[302] <https://docs.konghq.com/hub/kong-inc/saml/>

[303] <https://github.com/nginxinc/nginx-saml>

[304] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/crds/auth/#saml-authentication>

[305] <https://avinetworks.com/docs/20.1/single-sign-on-with-saml/>

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[307] <https://kubernetes.github.io/ingress-nginx/user-guide/monitoring/>

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<https://docs.konghq.com/hub/kong-inc/prometheus/>

statsd:

<https://docs.konghq.com/hub/kong-inc/statsd/>

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[310] Prometheus:

<https://docs.nginx.com/nginx-ingress-controller/logging-and-monitoring/prometheus/>

[311] <https://www.haproxy.com/blog/haproxy-exposes-a-prometheus-metrics-endpoint/>

[312] <https://www.haproxy.com/blog/haproxy-exposes-a-prometheus-metrics-endpoint/>

[313] <https://voyagemesh.com/docs/10.0.0/guides/ingress/monitoring/using-builtin-prometheus/>

[314] <https://istio.io/latest/docs/tasks/observability/metrics/>

[315] <https://projectcontour.io/guides/prometheus/>

[316] <https://www.getambassador.io/docs/latest/topics/running/statistics/>

[317] <https://docs.solo.io/gloo/1.1.0/observability/metrics/>

[318] <https://doc.traefik.io/traefik/observability/metrics/overview/>

[319] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/metrics/prometheus-grafana/>

[320] <https://github.com/kubernetes-sigs/aws-load-balancer-controller/issues/1212>

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[322] <https://github.com/kubernetes/ingress-nginx/blob/master/docs/user-guide/third-party-addons/opentracing.md>

[323] zipkin:

<https://docs.konghq.com/hub/kong-inc/zipkin/>

[324] Opentracing:

<https://docs.nginx.com/nginx-ingress-controller/third-party-modules/opentracing/>

[325] <https://github.com/haproxytech/spoa-opentracing>

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[326] <https://istio.io/latest/docs/tasks/observability/distributed-tracing/>

[327] <https://github.com/projectcontour/contour/issues/399>

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[332] <https://developer-docs.citrix.com/projects/citrix-observability-exporter/en/latest/deploy-coe/>

[333] Per Virtual Service Traffic Logs are supported as an alternative

[334] <https://github.com/solo-io/gloo/tree/master/install/helm/gloo/crds>

[335] <https://doc.traefik.io/traefik/reference/dynamic-configuration/kubernetes-crd/>

[336] CRD support tracked at:
<https://github.com/kubernetes-sigs/aws-load-balancer-controller/issues/1515>

[337] <https://github.com/avinetworks/avi-helm-charts/blob/master/docs/AKO/crds/overview.md>

[338] <https://github.com/jcmoraisjr/haproxy-ingress/issues/400>

[339] <https://opensource.zalando.com/skipper/kubernetes/ingress-controller/#aws-deployment>

[340] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/deploy/deploy-cic-yaml/#deploy-the-citrix-ingress-controller-for-a-namespace>

[341] <https://kubernetes-sigs.github.io/aws-load-balancer-controller/latest/deploy/configurations/#limiting-namespaces>

[342] <https://gateway-api.sigs.k8s.io/concepts/api-overview/>

Status:

<https://gateway-api.sigs.k8s.io/implementations/#implementation-status>

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[344] <https://github.com/nginxinc/nginx-kubernetes-gateway>

[345] Partial implementation since 0.13 <https://haproxy-ingress.github.io/v0.13/docs/configuration/gateway-api/>

[346] Beta:

<https://istio.io/latest/docs/tasks/traffic-management/ingress/gateway-api/>

[347] <https://projectcontour.io/guides/gateway-api/>

[348] v1alpha1:

<https://cloud.google.com/kubernetes-engine/docs/concepts/gateway-api>

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[351] <https://developer-docs.citrix.com/projects/citrix-k8s-ingress-controller/en/latest/deploy/service-mesh-lite/>

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[353] <https://kubernetes.github.io/ingress-nginx/user-guide/nginx-configuration/annotations/#canary>

[354] <https://docs.konghq.com/hub/kong-inc/canary/>

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[358] https://docs.solo.io/gloo/1.2.0/gloo_routing/virtual_services/canary/

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